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Fish Species Presence and Abundance Of the Table River, 1995

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ABSTRACT

A reconnaissance level survey of the Table River and its tributaries was conducted from July to September, 1995. The Table River is located in north-eastern B.C. and flows into the Parsnip River. A major component of this survey included: fish habitat (biophysical) evaluations, collecting water temperature data, and videotaping habitat features from a helicopter. Another component of this survey, and the focus of this report, was to use a combination of angling, electrofishing, and underwater fish counts to identify fish species presence and abundance of the Table River. A major emphasis was on Arctic grayling *(Thymallus arcticus)* due to its recent ranking (1995) as being critically imperilled within the Williston Reservoir watershed by the B.C. Conservation Data Centre. Captured fish in the Table River watershed include: Arctic grayling, bull trout *(Salvelinus confluentus)*, burbot *(Lota lota)*, dace *(Rhinichthys spp.)*, northern squawfish *(Ptychocheilus oregonensis)*, rainbow trout *(Oncorhynchus mykiss)*, sculpins *(Cottus spp.)*, suckers *(Catostomus spp.)* and whitefish *(Prosopium spp.)*. Angling efforts produced a total of 189 adult fish with Arctic grayling comprising 66% of the total catch. Electrofishing efforts captured a total of 964 fish, of which sculpins were the most abundant (69.6%). Numerous fish (n=3,624) were observed during a single pass underwater fish count of 23.5 km of river. Mountain whitefish comprised 73 % of this underwater count. A mark-recapture fish population estimate for Arctic grayling from km 35.5 to 32.0 from the mouth of the Table River was estimated at 251 fish. Areas of difficult fish passage exist at km 37.6, 42.7, and 54.0 from the mouth which inhibit upstream fish movement. Bull trout were the only fish species observed as far upstream as 54 km from the mouth. Arctic grayling were only encountered in the mainstem and none were observed in the tributaries. A noticeable number of Arctic grayling were observed in reaches 3 and 4 (approximately km 32.0 to 37.6 from the mouth) of the mainstem. Further studies will be conducted in 1996 to determine the habitat preference and distribution of Arctic grayling and other fish in the Table River system.

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INTRODUCTION

A reconnaissance level survey of the Table River was conducted in the summer of 1995. The Table River is tributary to the Parsnip River which drains into the Parsnip Reach of Williston Reservoir. This reservoir is located in north-eastern British Columbia. The main objectives of the survey were:

1. to gather life history information of fish species encountered, and their habitat requirements;

2. to identify current limitations to the fish populations, and habitat alterations/damage resultant from activities within the watershed (logging, road construction, railway construction); and

3. to develop management, mitigative, compensatory, and enhancement plans to restore the productive capacity of the Table River fish resource.

The Table River contains many fish species, two of which are of increasing concern. The Arctic grayling *(Thymallus arcticus)* population is one of them. Arctic grayling are currently "red listed" (QS1). This species' status indicates that within the Williston Reservoir watershed, the species is critically imperilled because of extreme rarity or some factors making it vulnerable to extirpation or extinction (Anonymous 1995). Life history information on Arctic grayling populations within the Williston Reservoir watershed is lacking. In order to protect this population, the Ministry of Environment, Lands and Parks established a catch and release regulation in 1995 for Arctic grayling within the Williston Reservoir watershed. Due to the fact that little information exists on the Arctic grayling population in the Williston Reservoir watershed, these fish will be investigated intensively in the Table River in relation to the objectives of this reconnaissance level survey.

The other species of concern in the Table River is bull trout *(Salvelinus confluentus)*. Bull trout are currently "blue listed" (S3). This species' status indicates that the species is rare or uncommon, and may be susceptible to large-scale disturbances (Anonymous 1995). Life history information on bull trout populations within the Williston Reservoir watershed is also lacking. The information gathered from bull trout during this Table River study may be useful for future enhancement, protection, and management applications for the Table River population and other populations in the watershed.

This data report summarises the 1995 fish enumeration activities and results. The purpose of this report is to briefly analyse, and provide a record of, the fish species presence and abundance data collected during the 1995 reconnaissance level survey of the Table River. The Arctic grayling and bull trout life history information collected will be vital to their future management and may also be applicable to compare with other similar fish populations within the Williston Reservoir watershed. A second detailed report entitled "A Reconnaissance Survey of the Table River: 1995 Status Report" by Langston (1998) provides further detailed methods and results on the remaining 1995 field surveys.

Study Area

The Table River is situated in British Columbia's central interior, approximately 100 km north of Prince George (Fig. 1). The Table River is tributary to the Parsnip River. The confluence of these two rivers is situated 75 km upstream from the southern end (Parsnip Reach) of Williston Reservoir. The Table River is 56 km long, and drains a watershed of 50,600 ha (506 km^2). The watershed is situated in the Misinchinka Ranges of the Rocky Mountains.

The Williston Reservoir watershed is located within the Sub-Boreal Spruce biogeoclimatic zone. The surficial substrate of the Table River area is composed of colluvial materials found in the valley walls and lacustine materials in the valley floor (Anonymous 1984). The upper one third (18 km) of the river flows through a narrow valley with steep mountain walls. The stream bed in this section is comprised primarily of gravel and cobble with occasional bedrock outcroppings. The lower two thirds (38 km) of the river meanders through a one to two kilometre wide valley flat. The stream bed in this section consists of mainly fines and gravel. A near zero gradient with long sections of glides are common in the lower part of the river, subsequently velocities are reduced and areas of sediment deposition are frequent. No continuous discharge monitoring stations have been set up on the Table River system.

Past logging practices and railroad construction activities have occurred within the Table River watershed. For approximately the last 30 years, logging activities have taken place which are mainly silviculture in nature. These harvesting practices have primarily occurred in the lower two thirds of the watershed where the valley is mainly flat. Within this section, timber harvesting has taken place inside some riparian zones. The headwaters of the Table River has steep sides to the valley and thus harvesting is minimal. Railroad operation and maintenance activities are present within the Table River watershed but timber harvesting has ceased since 1990. The BCR electric railroad construction initiated in 1981 and the line extends from Tacheeda Lakes to Tumbler Ridge, B.C. This railroad follows within close proximity of the Table River for most of its length. Due to the railroads close proximity, the line crosses the mainstem once and many of the Table Rivers tributaries. In addition to the railroad, a secondary road runs parallel to the railroad to facilitate railroad maintenance. This road was also used for past logging access.

METHODS

Fish Sampling and Abundance Surveys

Various methods of fish capture and observations were used for surveying the Table River fish population. These methods include: angling, electrofishing, gee trapping, and underwater fish counts. Each method utilised was for a specific reason, based on the objectives of the study.

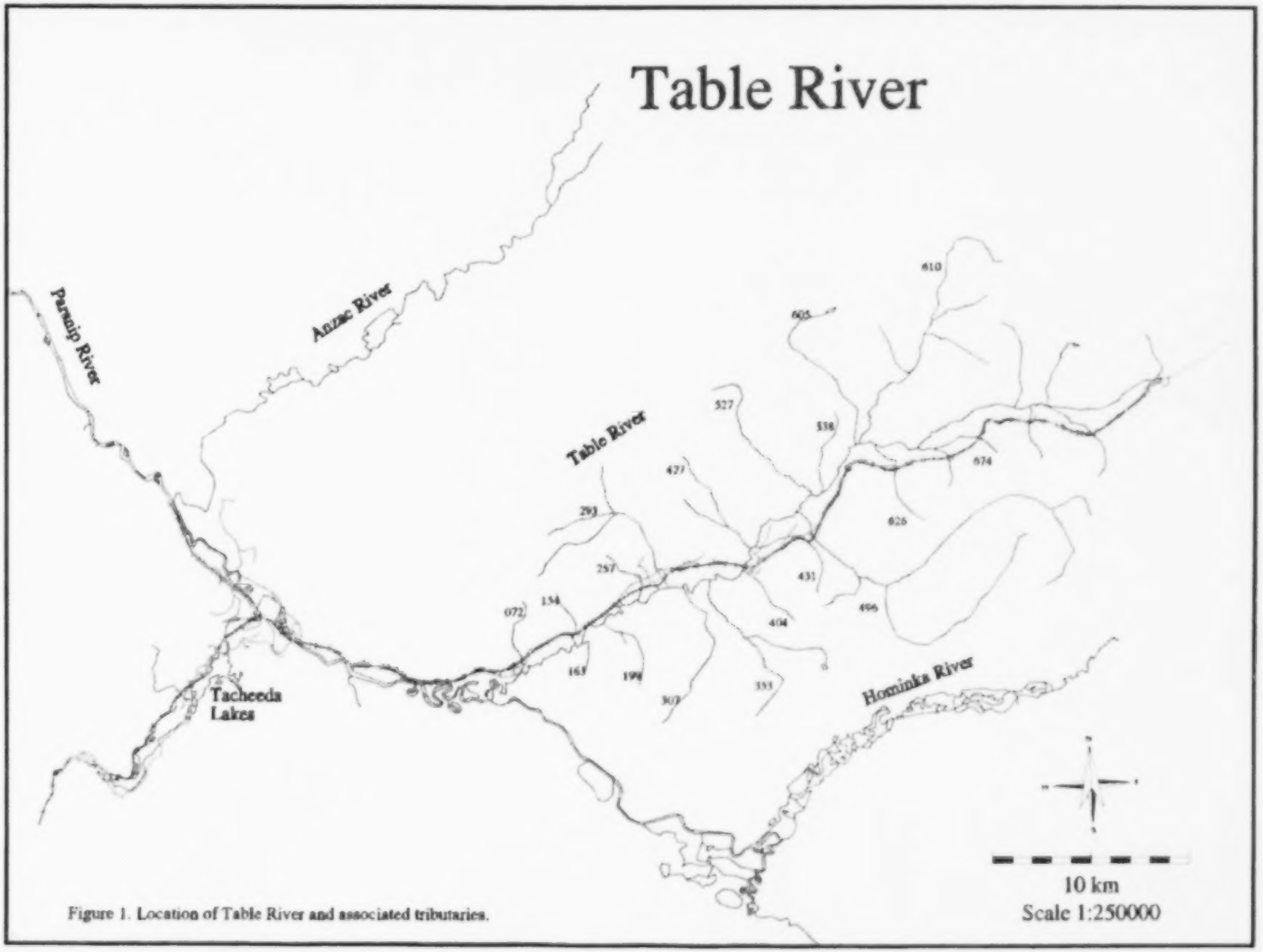

Figure 1. Location of Table River and associated tributaries.

Electrofishing

To obtain information on fish species presence in the Table River watershed, electrofishing was conducted in the tributaries and in the mainstem. Two methods of electrofishing were used to identify: 1) fish species presence/absence, and 2) fish density estimates. To identify fish presence, the stream was electrofished without the use of stop nets (open site). To determine fish density estimates, stop nets were used along a section of stream (closed site), and either a two or three pass method was used to capture fish. The total electrofished area was then recorded. Population estimates (# per m^2) were generated by the American Fisheries Society program "Microfish 3.0" (Van Deventer and Platts 1985).

All captured fish were identified, enumerated, and sampled. Fish were treated with a solution of one Alka Seltzer tablet dissolved in 3 litres of fresh water. Fork lengths were measured to an accuracy of 1.0 mm and weights were measured to an accuracy of 0.1 g. Scale samples (for age analysis) were obtained from all Arctic grayling, and a representative sample of bull trout and rainbow trout *(Oncorhynchus mykiss).* After the fish was sampled, it was revived and released back into the stream.

Gee Trapping

Another method used to collect information on fish species presence in the Table River watershed was the use of gee traps. These traps were baited with either fish roe or sardines and were set during the daylight hours on one day and left to fish overnight. They were placed in a variety of habitats such as weed beds, under overhanging vegetation, or amongst submerged logs. Captured fish were identified by species, enumerated, measured, and weighed as described in the previous section. No scale samples were taken for age determination.

Underwater Fish Counts (single pass)

Single pass underwater fish counts were used to identify fish species presence and to determine population estimates for fish in the Table River. An underwater fish count was conducted from the 35.5 km point of the river to the mouth (0 km), with the exception of km 29 to 24 which was not surveyed due to difficult access. Two experienced swimmers, equipped with dry suits, masks, and snorkels, floated downstream in pre-assigned lanes, and recorded all fish observed for each one kilometre length of stream. Swimmers lanes were situated so as to encompass the mid-channel and near shore zone of the river. While floating downstream, swimmers would look ahead to count fish and also to the left and right.

Arctic grayling, bull trout, rainbow trout, and whitefish *(Prosopium spp.)* were enumerated by size category (0 - 10 cm, 10 - 20 cm, 20 - 30 cm, 30 - 40 cm, 40 - 50 cm, 50 - 60 cm, and 60 - 70 cm). Tagged fish were recorded and its colour of tag was noted. Northern squawfish *(Ptychocheilus oregonensis), sculpins (Cottus spp.),* and suckers *(Catostomus spp.)* were only enumerated and no size breakdown was undertaken. Approximately five measurements of the wetted width of the river was taken for each kilometre section and an average was calculated.

When performing underwater fish counts, the total wetted width of the river needs to be observed by the combined visibility of all swimmers in order to obtain an accurate fish count. Otherwise, not all fish have a chance of being observed and the fish counts would then be underestimated. The mean wetted width and the limit of visual observation for each section was measured for the Table River. Once all the fish were enumerated for each kilometre section, fish counts were then expanded, if necessary, based on the total visible length of the two swimmers. The underwater "visibility" is the longest distance a swimmer is able to accurately identify a fish by species and estimate its length when looking in either direction. If the combined visibility of the swimmers was equal to or greater than the entire wetted width of the stream, then the swimmers had a chance of observing every fish present and no expansion was applied to that kilometre section. Results from the single pass survey were used to determine species abundance and the distribution of fish within the lower *2/3* of the river.

Underwater Fish Counts (two pass)

Once the single pass underwater fish count was completed, replicate underwater fish counts were used to determine population estimates of select fish species in the Table River. Two representative sites on the Table River were established to perform the multiple pass surveys. Due to difficult access, the upper *1/3* of the river could not be surveyed. Therefore, the lower *2/3* of the Table River, was divided into two representative segments (upper segment and lower segment) of the river. These segments were chosen as they were representative of the two generalised type of mainstem habitat encountered in the lower *2/3* of the Table River. Underwater fish counts were then conducted which followed the methodology outlined in Slaney and Martin *(1987)* and are further explained in the results section of this report.

Selection of these two segments were based on habitat characteristics. The upper river segment was represented by the section of river from km *37.6* to *26.7*. **In** this upper segment, the habitat characteristics of the Table River has a relatively fast velocity (between *0.5* and 1.0 m/sec), large substrate (gravel/cobble), narrow wetted width *(<20* m), and short meandering riffles. The lower river segment was represented by the section of river from km *26.7* to km 0. In this lower segment, the habitat characteristics of the Table River is low velocity (< *0.5* m/sec), small substrate (fines/gravel), wide wetted width (> *20* m), and long straight glides.

Within each segment, a smaller section or subsection of river was to be surveyed for replicate fish counts (Fig. *2).* The sections selected were km *35.5* to *32.0* (upper river section) and km *9.8* to *5.0* (lower river section). Two and three swimmers were assigned to the upper and lower sections of the river respectively. Underwater fish counts were conducted twice for each section to provide replicate fish counts. Swimmers were situated equally apart within the wetted width of the river. While floating downstream, swimmers would look straight ahead to count fish and also to the left and right. The visibility of the water was recorded for each kilometre of stream surveyed. Fish were enumerated and an estimate of its length was recorded. Tagged fish were also recorded and its colour of tag was noted.

While conducting the two pass underwater fish counts, not all fish could be observed. Inevitably some fish were not counted by the swimmers. Fish may not have been detected due to factors such as fish "hiding" and the attention of the swimmer being distracted by observing

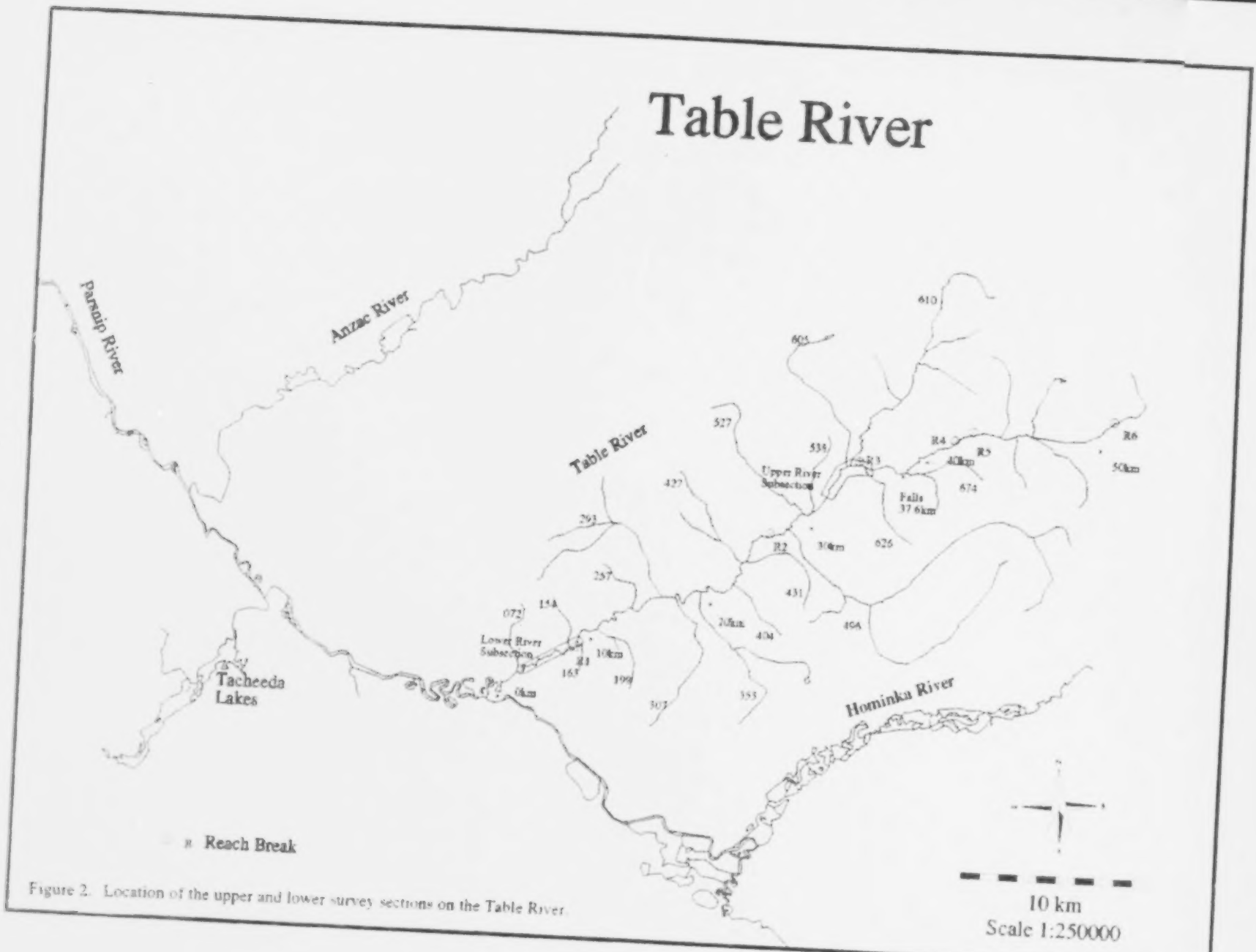

Figure 2. Location of the upper and lower survey sections on the Table River.

other fish. Therefore, correction factors were applied to the two pass underwater count results to compensate for "hiding" fish. The correction factor for each fish species was calculated based on the methodology outlined in Slaney and Martin (1987). These calculations are quite extensive, and the mark-recapture procedures require that they meet two different criteria to provide an unbiased estimate of a population of fish. This information is further explained in the results section of this report.

Mark-Recapture

Petersen mark-recapture population estimates were generated for Arctic grayling, bull and rainbow trout by Floy tagging fish greater than 200 mm in length. Twenty percent of the population of each species was required to be marked (Vincent 1971). A hooking mortality estimate of 4% was used based on Wydoski's 1977 fly-fishing hooking mortality study. Underwater fish counts were conducted twice for each section to provide replicate counts. Data collected from the two pass survey was then used to determine fish population estimates.

Prior to swimming the two sections, fish were marked to facilitate the mark-recapture study. Angling techniques were employed to capture fish in the upper and lower river sections. Fish captured in the lower section were marked with green coloured tags while fish captured in the upper section were marked with blue coloured tags. Additional fish were captured at the upper falls site (km 37.6) with red tags but are not included in the mark recapture fish estimates. Artificial flies, lures (spinners and spoons), and various baits were utilised. Since a major component of this Table River survey was focused on Arctic grayling, the capture of fish was slightly biased towards these fish. The majority of the angling effort was with the use of artificial flies. Arctic grayling, bull and rainbow trout larger than 200 mm were Floy tagged as described by Slaney and Martin (1987). Scale samples (for age analysis) were taken from Arctic grayling and rainbow trout of all sizes, and bull trout less than 350 mm in length. Fin ray samples (also for age analysis) were obtained from bull trout greater than 350 mm in length. The fork length and weight of each tagged fish was also recorded.

Age versus Length Analysis

Age and fork length data collected for all Arctic grayling, bull and rainbow trout from the Table River watershed was used for analysis. Mean fork lengths were calculated for each age group of fish species. This data was used to graphically depict the mean length-at-age for each of the three species of fish. Length-at-age of Arctic grayling from the Table River were then compared to Arctic grayling in the Mesilinka, Nation, and Parsnip rivers.

Since the sample size of each age of fish for each species can be small (< 30), standard error bars were used to visually represent the margin of error or degree of uncertainty for each mean length at age. These error bars show how precise the actual mean length is for the data set and depends on the number of samples used. For example, a four year old Arctic grayling that has only 3 or 4 samples for length are generally going to show larger error bars around the mean length when compared to an age four rainbow trout which may have 35 samples for length. With the larger sample size for rainbow trout, the mean length will generally be more precise and present smaller error bars.

RESULTS

Fish Species Presence

Many fish species (n=9) were observed in the Table River watershed. These fish include: Arctic grayling, bull trout, burbot *(Lota lota),* dace *(Rhinichthys* spp.), northern squawfish, rainbow trout, sculpins, suckers, and whitefish *(Prosopium* spp.), Members of the dace, sculpin, sucker, and whitefish families were not keyed out to the species level of fish identification. Fish from these four groups have been placed into their respective families and reported accordingly.

Fish identification of the non keyed out fish is still somewhat possible to the species level. One species of dace *(Rhinichthys cataractae* or longnose dace) is known to inhabit the Parsnip River (Anonymous 1978b). Two species of sculpins are also known to occur in the Parsnip River which include the slimy sculpin *(Cottus cognatus)* and the prickly sculpin *(Cottus asper),* (Anonymous 1978b). Three sucker species are known to inhabit the Parsnip River (Anonymous 1978b). These three species are the large-scale sucker *(Catostomus macrocheilus),* longnose sucker *(Catostomus catostomus),* and white sucker *(Catostomus commersoni).* According to a 1980 Sigma Resources Consultants Ltd. report, mountain whitefish *(Prosopium williamsoni)* is listed as a species of whitefish inhabiting the Table River. All or some of these previously mentioned fish species could also inhabit the Table River.

Not all of the previously mentioned fish species were captured throughout the mainstem Table River and its tributaries. The Table River mainstem contains three areas of difficult fish passage which have an affect on species distribution throughout the river. At 37.6 **km** upstream from the mouth, a 2.0 m vertical waterfall exists and is an area of difficult upstream fish passage. A second area of difficult fish passage exists at km 42.7 (cascade, 1.0 m waterfall, and chute). The third area of difficult fish passage exists at km 54 of the mainstem (approximately 10% gradient change). These obstructions limit fish distribution and upstream migration.

Fish species distribution within the Table River varies by species. Suckers were generally located only in the lower 20 km of the mainstem and its associated tributaries. Downstream of the first fish obstruction (km 37.6), sculpins, rainbow trout, and whitefish were distributed throughout the entire mainstem and associated tributaries. Arctic grayling were only encountered in the mainstem of the Table River below the falls (km 37.6). Burbot, dace, and northern squawfish were observed too infrequently to define their distribution; although, burbot were generally observed as far upstream as 35.6 km of the mainstem and its associated tributaries. Dace (n=5) were only observed in tributary 072. Northern squawfish were generally located only in the first 11 km of the mainstem river. In-between the first and second obstruction, a few sculpins were found. Above the second obstruction, only bull trout were observed in the mainstem. The area above the third obstruction (54 km) was not surveyed.

Fish Sampling and Abundance Survey Results

Various methods of fish capture along with visual observations were used for surveying the Table River fish population. These methods include: angling, electrofishing, gee trapping, and underwater fish counts. Each method utilised on the Table River was for a specific reason, based on the goals of the survey.

Electrofishing results

Juvenile fish were found exclusively by electrofishing with the exception of sculpins which have been included here for ease of reporting (Table 1). Electrofishing was undertaken at 40 locations within the watershed (Appendix I). Sixteen sites were located on the Table River mainstem, and 24 sites were situated on 15 of the tributaries. The total surface area electrofished was 39,983 m^2 with more electrofishing effort put on the tributaries. Surface area electrofished in the tributaries was 24,785 m^2, or 62% of the total effort. Mainstem electrofishing covered 15,198 m^2, representing the remaining 38% of the electrofishing effort.

Table 1. Total number of fish captured by electrofishing.

Fish	Number of fish captured in the mainstem	Number of fish captured in the tributaries	Total number of fish captured
Arctic grayling	13	0	13
burbot	11	17	28
bull trout	35	47	82
rainbow trout	16	119	135
sculpin (family)	224*	447	671*
sucker (family)	2	15	17
whitefish (family)	8	10	18
Total number of fish	309	655	964

* Indicates that not all captured sculpins were enumerated.

Nine hundred and sixty-four, fish were captured in the Table River watershed by electrofishing. Sculpins comprised a large percentage, approximately 70%, of the fish. Sixty-seven percent of the enumerated sculpins were captured in tributaries. The number of sculpins enumerated in the mainstem (Table 1) is only an estimate. Sculpins captured at one mainstem site (km 34.1 to 34.5) were not enumerated by the field crew. Instead, the number of sculpins captured was recorded as "many" (Appendix I). Arctic grayling were the least numerous fish captured and were observed only in one spot of the mainstem. No Arctic grayling were captured by electrofishing within the tributaries of the Table River.

Fish density estimates were determined for 12 sites in, the Table River by electrofishing (Appendix II). These sites were deemed representative of the stream reach in which they were surveyed, thereby allowing fish density extrapolation into the entire stream reach. The two or three pass removal method was used to collect fish. These closed sites averaged approximately 440M^2 in size. Density estimates for all species were calculated, but only game fish (except whitefish) will be referred to in this section of the report.

The highest bull trout density was observed in tributary 626 at 0.011 fish per m^2 for young-of-the-year fish and 0.014 fish per m^2 for juvenile bull trout (Table 2). The highest rainbow trout density was observed in tributary 154 at 0.044 fish per m^2 for each, of the two age classes. No Arctic grayling were captured in any of the closed site areas.

Table 2. Comparison of game fish densities and population estimates.

Stream	Reach #	Date (y/m/d)	Water temp. (C°)	Surface area (m^2)	Number of estimated fish	[1]Fish species and age	Fish Density (#/m^2)
Tributary 154	2	950830	9.0	360	16	RB 0 +	0.044
"	"	"	"	"	16	RB	0.044
Tributary 293	1	950906	9.0	600	3	BT	0.005
"	"	"	"	"	22	RB 0 +	0.037
"	"	"	"	"	14	RB	0.023
Tributary 353	1	950921	-	483	6	RB 0 +	0.012
Tributary 496	1	950908	-	660	2	RB	0.003
Tributary 527	1	950929	7.5	520	1	BT	0.002
"	"	"	"	"	1	RB 0 +	0.002
"	"	"	"	"	1	RB	0.002
Tributary 610	1	950901	-	550	2	BT	0.004
"	"	"	"	"	2	RB	0.004
Tributary 626	1	950822	-	1056	12	BT 0 +	0.011
"	"	"	"	"	15	BT	0.014
"	"	"	"	"	6	RB 0 +	0.006
"	"	"	"	"	28	RB	0.027
Mainstem (38.5 km)	4	950927	7.5	287	3	BT 0 +	0.010
"	"	"	"	"	2	BT	0.007
Mainstem (50.8 km)	6	950929	7.0	261	1	BT	0.004

[1] The fish species column is broken down into two age categories. Fish aged 0 + are strictly young-of-the-year fish while all other fish consist of ages 1 year and older combined (juveniles). This breakdown provides a better comparison between young-of-the-year and juvenile fish. BT = bull trout and RB = rainbow trout.

Sixteen additional open sites were electrofished to determine fish presence or absence (Appendix II). Captured fish include: Arctic grayling, bull trout, burbot, rainbow trout, sculpin spp., sucker spp., and whitefish spp. Most sites contained few fish, although one particular site produced 16 bull trout, 13 Arctic grayling, 6 rainbow trout, and 1 burbot. This higher populated site (mainstem km 26 to 27) was the only place where Arctic grayling were captured during electrofishing. This electrofishing site was within habitat not expected, by the field crew, to support significant fish populations. The area could best be described as a receding riffle. The site was located on the downstream end of a long glide/pool, and just upstream of a riffle. Habitat characteristics of this site contained shallow water (10 cm or less), primarily small cobble substrate, and little to no flow.

Gee Trapping Results

Gee traps were used minimally. Only three sites, within tributaries, were chosen to sample fish in the Table River system (Table 3). No mainstem sites were chosen for gee trapping. Fish were captured at all three sites, but no juvenile game fish were captured.

Table 3. Gee trapping results.

Location	Date	Habitat type	Fish captured	Number of fish caught
Tributary 353	Aug. 10, 1995	wetland area	sucker (family)	5
Tributary 072	Aug. 15, 1995	swamp	dace (family)	5
Tributary 427	Aug. 16, 1995	mouth area	sculpin (family)	1
			whitefish (family)	1

The location of the first gee trapping site was located in a wetland area adjacent to tributary 353 (approximately 600 m from the mouth). The second location was a swamp located 100 m downstream of the road crossing on tributary 072. The third location of gee traps were set at the mouth of tributary 427. No significant habitat difference was noted between these three sites. The most numerous fish species captured by gee trapping were suckers and dace (each with 5).

Underwater Fish Count Results (single pass)

Single pass, two person underwater fish counts were conducted on the following dates: July 6 and 7 from km 35.5 to 29, July 9 from km 24 to 17, and July 18 and 19 from km 17 to the mouth (km 0) of the Table River. These surveys were used to determine the distribution of fish species throughout the mainstem. A five kilometre section (km 29 to 25) was not surveyed due to difficult access. Mean wetted widths and visibility for each section were measured to provide an expanded fish count. Observed fish species included: Arctic grayling, bull trout, northern squaw fish, rainbow trout, suckers, and whitefish. The number of fish observed per kilometre by each fish species was enumerated (Appendix III).

In the single pass survey, many fish were observed. Whitefish *(n=2,627)* was the most numerous species observed. The next highest count was suckers at 693, Arctic grayling at 165, rainbow trout at 66, northern squawfish at 51, and bull trout at 22. The greatest number of fish observed per kilometre occurred between km 24 to 23 (n=491). Since the swimmers could not see the entire wetted width, the actual numbers of fish observed in each kilometre section were then expanded (Fig. 3) to the number of fish believed present (Appendix III). The highest expanded count of fish believed to be present occurred between km 36 to 35 (790 total). Note that the expanded values for kilometre 36 to 35 have been doubled as only the lower 500 m of this section was surveyed.

Spikes or locations of dramatic increase in fish numbers (Fig. 3), occur at km 36 (Arctic grayling), km 24 (whitefish), km 20 (suckers), km 17 (whitefish and suckers), and km 7 (rainbow trout). Arctic grayling populations were highest in the upper river, while sucker observations were noticeably higher in the lower sections of the river. Bull trout distribution

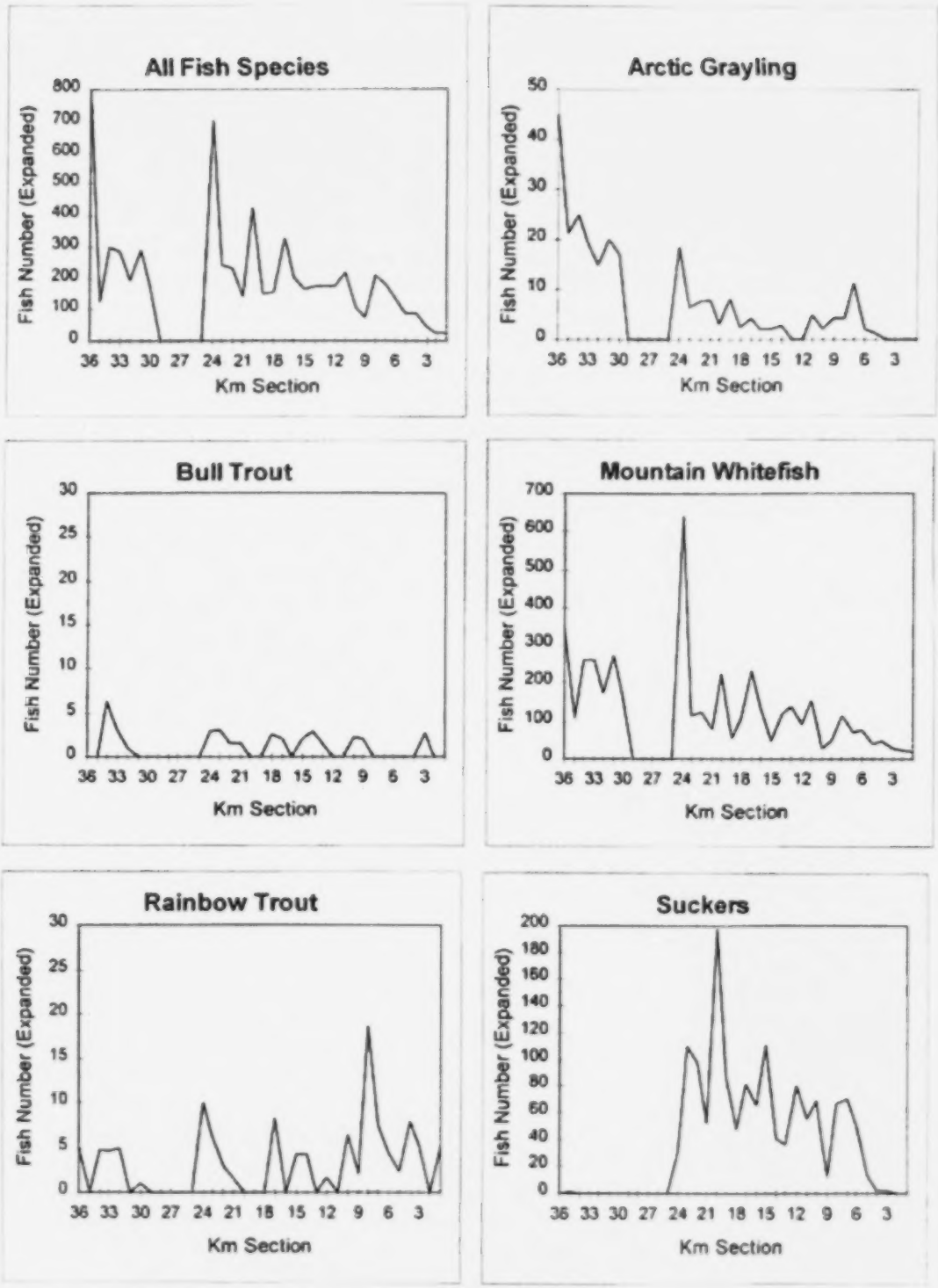

Figure 3. Estimated number of fish by kilometre section using single pass underwater counts.

was uniform in low concentrations along the entire length of the river. Rainbow trout numbers were also uniform in distribution along the length of the river though increase slightly in the lower sections. Whitefish appear in slightly higher numbers in the upper sections. Northern squawfish were found only in the first 11 km.

Underwater Fish Count Results (two pass)

To facilitate the mark-recapture study, Arctic grayling, bull and rainbow trout were marked with Floy tags. Tagging efforts were initiated on July 20 and ended on August 3 with the majority of tags being placed from July 27 to August 2. One hundred seventy-six adult fish were angled throughout the two representative sections of the mainstem (Table 4). Floy tags were applied to 147 of these fish (Appendix IV).

Table 4. Total number of captured and tagged fish by section.

Location	Arctic Grayling		Bull Trout		Rainbow Trout	
	captured	tagged	captured	tagged	captured	tagged
Lower Section	34	20	2	2	36	22
Upper Section	84	83	10	10	10	10
Total fish tagged	118	103	12	12	46	32

Angling for adult fish revealed that species abundance was quite different between the upper and lower sections (Table 4). The majority of Arctic grayling and bull trout were caught in the upper section while the majority of rainbow trout were captured in the lower section. Angling effort was slightly higher in the upper section. Floy tags were applied to 103 Arctic grayling, 32 rainbow trout, and 12 bull trout. From these capture results, angling may be biased towards Arctic grayling.

A two pass underwater fish count was conducted on August 9 and 11, *1995*. These counts were in the upper (km 35.5 to 32.0) and lower (km 9.8 to 5.0) sections. The data from these two swims (Appendix V) was used to determine fish population estimates (Appendix VI). Arctic grayling, bull trout, and whitefish were observed in higher concentrations in the upper section as compared to the lower section. Arctic grayling observations were more distinct as 222 fish (total for both passes) were seen in the upper section as compared to 64 fish (total) observed in the lower section. Bull trout observations revealed 39 fish (total) in the upper section and 28 fish (total) in the lower section. Whitefish numbers were also more distinct as 1,594 fish (total) were seen in the upper section while 1,037 fish (total) were observed in the lower section. Rainbow trout, northern squawfish, and suckers were observed in the lower section more than they were observed in the upper section. Total rainbow trout numbers were 168 (total) in the lower section and 23 (total) in the upper section. No northern squawfish or suckers were observed in the upper section.

Total fish densities were derived for all fish in the upper and lower river sections of the Table River (Table 5). These numbers represent an estimate of fish numbers observed at each section. The entire stream width was visually covered by the swimmers on the upper section. Therefore, all fish could theoretically be counted and were not subject to any visual limitation

expansion factor. The entire stream width was not visually covered by the swimmers on the lower section. Therefore, not all fish could theoretically be counted and therefore, counts were subject to a visual limitation expansion factor. This expansion factor was 1.33 for the lower river section.

Table 5. Total fish densities, for all sizes of fish, using two pass fish counts.

	Arctic grayling		bull trout		northern squawfish		rainbow trout		sucker (family)		whitefish (family)	
# of fish / area	ha	km	ha	km	ha	km	ha	km	ha	km	ha	km
Upper Section	22.7	31.7	4.0	5.6	0.0	0.0	2.3	3.3	0.0	0.0	163.0	227.7
Lower Section	3.2	8.9	1.4	3.9	0.2	0.7	8.3	23.3	3.0	8.5	51.4	144.0

In the upper section (where the entire wetted width was visually observed by all swimmers), whitefish (227.7) had the highest number of fish per kilometre. The next highest count was Arctic grayling (31.7 fish per km) and then bull trout (5.6 fish per km). Rainbow trout came next at 3.3 fish per km. No northern squawfish or suckers were observed in the upper section during the replicate underwater fish counts. In the lower section, (where the fish counts had to be expanded), whitefish (144.0) were again the highest number of fish observed per kilometre. The next highest observed was rainbow trout (23.3 fish per km) and then Arctic grayling (8.9 fish per km).

Total fish density estimates for tagged fish greater than 20 cm in length were generated (Table 6). Population estimates for certain fish species in the Table River were determined from mark-recapture results of fish greater than 20 cm, (Appendix VI). From the two pass fish count results, only Arctic grayling, bull and rainbow trout were marked. Of these three tagged fish, Arctic grayling had the highest fish density in the upper section (31.7 fish per **km). In** the lower section, rainbow trout had the highest fish density (18.2 fish per km).

Table 6. Total fish densities, for tagged fish greater than 20 cm, using two pass fish counts.

	Arctic grayling		bull trout		rainbow trout	
# of fish per area	**ha**	**km**	**ha**	**km**	**ha**	**km**
Upper Section	22.7	31.7	4.0	5.6	2.3	3.3
Lower Section	2.6	7.2	1.3	3.6	6.5	18.2

Mark Recapture

Mark-recapture results were used to develop correction factors that would provide accurate estimates on fish populations (Table 7) if statistically valid. These results must meet two different criteria. First, to be statistically valid, a mark-recapture study requires the initial marking of fish (M) to be 20% or more of the total estimated fish population (N). Secondly, to avoid any bias due to low fish numbers, the total number of marked fish multiplied by the number of fish captured (C) should be more than four times the total estimated fish population (Robson and Regier 1964). This correction factor, if statistically valid, provides an accurate

estimate on the number of actual fish to expect for a certain area sampled. Even though the combination of all swimmers may be able to visually see fish within the entire wetted width of the stream, fish can be hiding and thus not counted.

Based on the above two criteria, the only valid mark-recapture result which provides a reliable correction factor was for Arctic grayling in the upper section. In this area, 81 Arctic grayling were tagged. On the first underwater fish count, 107 Arctic grayling were observed where 50 of these fish were tagged. On the second underwater fish count, 115 Arctic grayling were observed where 58 fish were tagged. With these results, the data passed the two criteria tests and provided a correction factor of 1.5 for Arctic grayling in the upper survey section. Correction factors for bull and rainbow trout were calculated; however, they did not meet the requirements of the mark-recapture test and are not statistically valid.

Table 7. Table River mark-recapture results with correction factors for **BT, GR, and RB.**

Section (swim #1 & #2)	Fish species	Total tagged	Total observed	Tags observed	Total fish	Mean N (2 swims #1 & #2)	Std. Error	Min. number	Significance test (MC > 4N)		(a) m/r	(b) u/w swim	Correction Factor
		M	C	R	N			M/N (%)	MC	4N	# fish/ha	# fish/ha	(a)/(b)
upper #1	BT	10	21	0	242	225.5	16.5	4.1	210	968	46.0	4.0	11.5
upper #2	"	10	18	0	209			4.8	180	836			
lower #1	"	2	13	0	42	31.5	10.5	4.8	26	168	2.4	1.3	1.8
lower #2	"	2	13	1	21			9.5	26	84			
upper #1	GR	81	107	50	174	167.4	6.2	**46.6**	**8667**	**695**	34.2	22.7	1.5
upper #2	"	81	115	58	161			**50.2**	**9315**	**645**			
lower #1	"	19	19	3	100	118.0	18.0	19.0	361	400	8.8	2.6	3.4
lower #2	"	19	33	4	136			14.0	**627**	**544**			
upper #1	RB	10	8	0	99	137.5	38.5	10.1	80	396	28.1	2.3	12.2
upper #2	"	10	15	0	176			5.7	150	704			
lower #1	"	21	56	3	314	324.0	10.5	6.7	1176	1254	24.2	6.5	3.7
lower #2	"	21	75	4	334			6.3	**1575**	**1338**			

- BT = bull trout, GR = Arctic grayling, and RB = rainbow trout.
- Total tagged includes a 4% reduction attributed to hooking and tagging mortality rate.
- Total fish N = (M + 1)(C + 1)/ (R +1).
- M/N = % of total population that was tagged. The minimum number to tag is 20% where the population (N) is less than 1000 (Vincent 1971).
- For a mark-recapture to provide an unbiased estimate, MC should be > 4N, or M + C equal or > N (Robson and Regier 1964).
- Enlarged numbers in bold are significant based on M/N > 20% and MC > 4N and are statistically correct.
- Only fish minimum 20 cm were tagged, all data including total observed, refer to fish equal to and greater than 20 cm long.
- (a) m/r calculation is where m = Mean N, and r = hectares of the section - where area of upper section = 4.9 ha., area of lower section = 13.4 ha.
- (b) u/w swim calculation refers to expanded underwater census results (see Table 6).

Only the correction factor of 1.5 in the upper section for Arctic grayling is statistically valid. This value indicates that the average number of fish actually observed (n=167.4) had to be multiplied by 1.5 to provide a better representation of the number of fish present. This correction factor indicates that 50% of the Arctic grayling present were not observed by the swimmers. Therefore, the estimated population for Arctic grayling within the upper section (km 35.5 to 32.0) of the Table River is 251 fish. The remaining correction factors can not be used to estimate accurate fish populations because they are not statistically valid.

Arctic Grayling Observations

Arctic grayling were observed only in the first 37.6 km of the mainstem of the Table River. The first set of falls are a barrier to upstream migration of Arctic grayling. No evidence of fish use by Arctic grayling in the tributaries, side channels, or back channel habitat was observed. No spawning activity by Arctic grayling was observed, and no locations of spawning identified. Although, it is important to note that field work did not commence until July. Arctic grayling spawning likely occurs in mid-May, as observed in the Sukunka River (Stuart and Chislett 1979).

Thirteen young-of-the-year Arctic grayling (age 0+) were captured between km 26 and 27 of the Table River. The fish were captured in locations with shallow water (10 cm or less), primarily small cobble substrate, and with little to no flow. The Arctic grayling were located in receding riffle habitat associated with the downstream end of large glides or pools. This location, in particular one 60 m^2 site within it, contained the highest concentrations of age 0+ Arctic grayling encountered in the Table River watershed.

The number of Arctic grayling observations were higher in the upper section of the Table River (Appendix IV and V). The population of Arctic grayling in the upper section was comprised of older and larger individuals in comparison to the lower section (Appendix VII). In the upper section, Arctic grayling averaged 316 mm in fork length and 4.8 years. In the lower section, the average length of Arctic grayling was smaller at 241 mm and the average age was 3.1 years. However, it is noted that ageing Arctic grayling scale samples older than age 4 is a problem and is probably not valid (Doug Fleming, Alaska Department of Fish and Game, pers. comm.).

Arctic grayling spawning locations were not observed. The highest concentration of adult Arctic grayling observed was in the confluence pool of Tributary 605 and the Table River. The observations were made in July and August, after the suspected peak spawning period from May to June. Therefore, it is not known if this site is a prime spawning area, or in close proximity to one. The site appears to have optimal adult rearing and feeding habitat.

Bull Trout Observations

Juvenile bull trout were captured in both the mainstem and in the tributaries. More juveniles (n=49) were caught within the 15 tributaries as compared to the number of bull trout captured in the mainstem (n=35), which may be a result of more electrofishing effort on the tributaries (an additional 9,587M^2). Juvenile bull trout were found as far upstream as 54 km from the mouth, but observations of fish presence from km 37.6 to 54.0 was not surveyed intensively due to access limitations. One site on the mainstem (km 27.0 to 26.0) contained sixteen juvenile bull trout. This location, in particular one 60 m^2 site within it, contained the highest concentrations of age 0+ bull trout encountered in the Table River watershed. Juvenile bull trout appeared to be evenly distributed throughout the mainstem from km 37.6 to the mouth, and they did not appear to congregate in any single site. Juvenile bull trout were also caught throughout many of the Table Rivers tributaries. Within these inhabited tributaries, it is unknown how far upstream the juvenile bull trout have migrated.

Adult bull trout were found throughout the mainstem as far upstream as 37.6 km from the mouth survey end. Within the mainstem, bull trout observations were higher in the upper section than in the lower section (Appendix IV and V). The population in the upper section was comprised of older and larger individuals as compared to the population in the lower section (Appendix VII). In the upper section, bull trout averaged 498 mm in length and 5.3 years in age. In the lower section, the average length of bull trout was smaller at 395 mm and the average age was 4.5 years old. Although no adult bull trout were observed past the first obstruction on the mainstem, it is safe to say that they are present up to 54 km from the mouth as juveniles were observed this far upstream.

Rainbow Trout Observations

Juvenile rainbow trout were captured in the mainstem and in the tributaries. More juvenile rainbow trout (n=132) were caught in the Table River system by electrofishing in comparison to Arctic grayling and bull trout (Table 1). The number of juvenile rainbow trout (117) was significantly higher in the tributaries when compared to the number of fish (n=15) caught throughout the mainstem. Again, electrofishing effort was emphasised more on the tributaries. Within the mainstem, juvenile rainbow trout were caught from the mouth up to the first set of falls. Juvenile rainbow trout were also caught throughout the lower associated tributaries. It is unknown how far upstream rainbow trout have migrated into these tributaries.

No adult rainbow trout were observed or captured in any of the 15 surveyed tributaries of the Table River. Adult rainbow trout were observed only in the mainstem from the mouth upstream to the falls (km 37.6). Rainbow trout numbers were higher in the lower section of the Table River (Appendix IV and V). The population in the lower section was comprised of shorter but older individuals in comparison to the upper section (Appendix VII). In the lower section, the average fork length of rainbow trout was 237 mm and the average age was 3.0 years old. In the upper section, rainbow trout averaged 271 mm in length and 2.9 years old.

Age versus Length Analysis

Data was collected for Arctic grayling age 0 to 7 fish (no age 1 data was collected), bull trout age 0 to 8 fish (no age 6 data was collected), and rainbow trout age 0 to 4 fish. Age and fork length measurements collected from all of these three fish species within the Table River watershed was used for analysis. Although, age analysis of Arctic grayling scales have been proven to be inaccurate after four years of age (Doug Fleming, Alaska Department of Fish and Game, pers. comm.). The annulus only appears on the scales up to the fourth year. Even though Arctic grayling grow in size over time, the annulus does not form continuously each year on the scale, thus resulting in the same age fish as the previous one. Therefore, age data after four years for Arctic grayling is likely not valid and should be used with caution.

Since all age classes of each fish species do not have the same number of samples, the calculated mean lengths had to be weighted for comparison purposes. The precision of the calculated mean lengths for each age group of fish are indicated by the standard error (Fig. 4, Table 8). Mean lengths for some age classes of fish are few and should be used with caution.

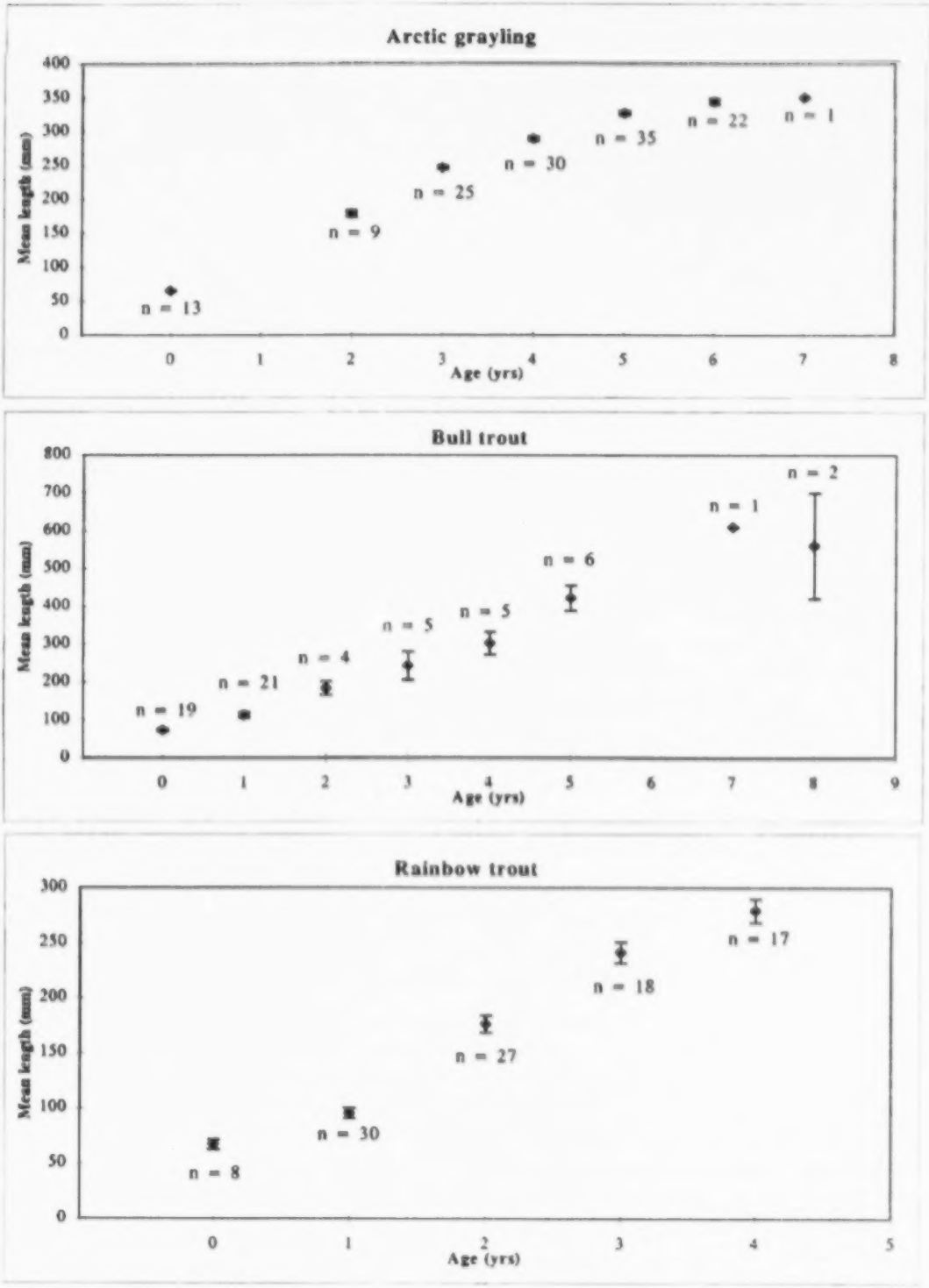

Figure 4. Mean fork length at age for three fish species in the Table River watershed.

Table 8. Fish catch statistics.

Species	Age (yrs)	'Mean fork length (mm)	Standard Deviation (SD)	Standard Error (SE) length (mm)
Arctic grayling	0	65(13)	3.56	0.95
	1	-	-	-
	2	178(9)	14.96	4.99
	3	246(25)	13.99	2.80
	4	289(30)	17.92	3.27
	5	327(35)	18.63	3.15
	6	344(22)	21.86	4.66
	7	350(1)	0.00	0.00
Bull trout	0	73(19)	14.29	3.28
	1	113(21)	34.03	7.43
	2	184(4)	35.75	17.88
	3	243(5)	82.13	36.73
	4	302(5)	67.69	30.27
	5	422(6)	81.53	33.28
	6	-	-	-
	7	610(1)	0.00	0.00
	8	560(2)	197.99	140.00
Rainbow trout	0	67(8)	12.89	4.56
	1	95(30)	24.88	4.54
	2	176(27)	40.65	7.82
	3	241 (18)	40.56	9.56
	4	279(17)	44.52	10.80

'Sample size (n) immediately follows mean fork length value.

When examining the growth rate of the three Table River game fish species (Fig. 4), bull trout had the largest mean length-at-age 0 (73 mm). Rainbow trout was the next largest with 67 mm as the mean length-at-age 0. Arctic grayling had a mean length of 65 mm at age 0. Data exists only as old as age 4 for examining the growth rates of these three fish species together. Bull trout appear to grow the fastest (Table 8). At age 4, bull trout had an average fork length of 302 mm, Arctic grayling was 289 mm in fork length, and rainbow trout was 279 mm in fork length. Although, these values are dependant on the number of representative samples collected for each species.

Length-at-age of Arctic grayling from the Table River (Table 9) was compared to other systems in the Williston Reservoir watershed (unpubl. data). Comparisons of fish in one system with those in another are difficult due to differences among times of collection, in sample sizes, in methods of analysis, and in age interpretation. In general, the growth rate of a fish species can be determined by plotting the mean fork lengths by age.

For comparison purposes, thorough data on Arctic grayling in the four systems of the Williston Reservoir only exists for aged 2 to 5 year old fish. Age 5 data should be used with discretion due to ageing problems. On average, the Nation River Arctic grayling appear to have the larger growth rate of the four systems while the Parsnip River Arctic grayling appear to have a smaller growth rate of the four systems.

Table 9. Table River Arctic grayling growth rate comparison with three Williston systems.

Age (yr.)	Table River Mean fork length (mm)	Table River Std. Dev.	Table River No. of fish	Mesilinka River Mean fork length (mm)	Mesilinka River Std. Dev.	Mesilinka River No. of fish	Nation River Mean fork length (mm)	Nation River Std. Dev.	Nation River No. of fish	Parsnip River Mean fork length (mm)	Parsnip River Std. Dev.	Parsnip River No. of fish
0	65	3.56	13									
1										140	24.2	5
2	178	14.96	9	198	11.08	8	236	7.55	6	190	13.1	8
3	246	13.99	25	261	25.65	42	280	10.2	28	242	37.1	11
4	289	17.92	30	305	20.32	40	317	13.75	32	275	31.7	17
5	327	18.63	35	338	20.54	23	331	7.67	10	307	22.1	15
6	344	21.86	22	361	19.05	12				333	21.2	14
7	350	0	1	369	19.85	9				351	18.3	10
8										386		2

DISCUSSION

Fish observed in the Table River watershed include: Arctic grayling, bull trout, burbot, dace, northern squawfish, rainbow trout, sculpins, suckers, and whitefish. Dace, sculpins, suckers, and whitefish were not keyed out to species level during the 1995 field studies. Previous studies by the Resource Analysis Branch of the Ministry of Environment identified sculpins captured in the Table River as slimy sculpins. The 1980 Sigma Resources Consultants Ltd. report indicate the presence of large-scale suckers, longnose suckers, mountain whitefish, prickly sculpins, and white suckers in the Table River. Dace have not previously been observed in the Table River; however, the 1980 Sigma Resources Consultants Ltd. report identified the presence of longnose dace in the Parsnip River. All of the previously mentioned fish species could possibly inhabit the Table River.

The electrofishing efforts did identify a number of tributaries (072, 199 and 431) where no fish were present in suitable habitat due to access barriers (dams) produced by beavers. An old cutblock exists at the lower end of tributary 431. Beaver activity appears to have increased in tributary 431 after the harvesting operation returned the forest stand around the stream to an early successional stage, predominated by beaver food such as willows. The stream above these dams was evaluated in 1995 and was deemed suitable fish habitat. These obstructions to fish will have to be removed if fish are to gain access and utilize this upstream fish habitat.

Underwater fish counts of game fish species in river systems do provide an indication of species composition. In the upper section, the species relative abundance observed from the underwater counts was 78% Arctic grayling, 14% bull trout, and 8 % rainbow trout. The species composition from angling was similar - 80% Arctic grayling, 10% bull trout, and 10% rainbow trout. In the lower section, the species relative abundance observed during the underwater count was 63 % rainbow trout, 25 % Arctic grayling, and 12 % bull trout. The species composition from angling was relatively the same - 50% rainbow trout, 45% Arctic

grayling, and 5 % bull trout. With the species composition similar to the distributions obtained from these salmonids captured with angling gear, this underwater census on the Table River could be useful for evaluating the effects of the fishery regulations (Slaney and Martin 1987).

Upstream fish migration on the Table River appears to be restricted for some species. A barrier (2.0 m vertical waterfall) to most fish species is located 37.6 km upstream from the mouth of the Table River. Only bull trout and sculpins were captured above the waterfall. A further 5.1 km upstream (km 42.7) a series of cascades, including a one metre waterfall, present another area of difficult fish passage. Bull trout were captured upstream of 42.7 km indicating successful migration past these cascades; however, sculpins were not. Sculpins could not have migrated unaided past the first 2.0 m waterfall at km 37.6. It is unknown how the sculpins were initially seeded upstream of the first waterfall. The population of sculpins upstream of the waterfall at km 37.6 are isolated within the 5.1 km between the two areas of difficult fish passage. At km 54, the gradient is very steep on the mainstem. Only juvenile bull trout were observed up to this gradient barrier. No surveys were conducted further upstream of the 54 km point.

A complete record of game fish distribution in the tributaries of the Table River was not attained. It is not known how much of the tributaries fish are utilising, as not all tributaries were studied. Some of the tributaries are known to have beaver dams or waterfalls on them. No single tributary was completely electrofished until fish distribution ceased. Only single, and sometimes two sections were electrofished on a tributary. Instead, more effort was placed on trying to determine species presence/absence within the tributaries. Most of the electrofishing sites were focused at the mouth of the tributary and at vehicle access points. Other areas that are less accessible may need to be electrofished to more accurately determine species presence/absence and distribution.

The distribution between juvenile and adult fish observed for each species in the Table River varies. Juvenile Arctic grayling were observed as far upstream as km 27 while the adults were observed as far upstream as km 37.6. Juvenile rainbow trout were observed as far upstream as km 35.6 while the adults were observed as far upstream as km 37.6. Juvenile bull trout were observed as far upstream as km 54. Although adult bull trout were only observed as far upstream as km 37.6, it is somewhat safe to assume that adult bull trout are located as far upstream as km 54. The first two obstructions are areas of difficult fish passage. It is still unknown if these two obstructions inhibit upstream migration of bull trout. The population of bull trout above these two obstructions could be a resident population.

Spikes or locations of dramatic increase in fish numbers occur at km 24, km 17, and km 7 sections. These sites are similar in that they contain deep pools or deep pools associated with a large debris jam. It has not been determined at this point if ideal adult summer rearing/feeding habitat such as these pools is a limiting factor to the overall fish population size of the Table River. These sites do have the capacity, due to their large size and depth of pools, to provide suitable overwintering habitat. If further investigations identify that this type of habitat is limiting the population size; the opportunity to enhance the fish populations through "debris catchers" and pool creation will be examined. Additional spikes occur at km

36 and km 20. It is postulated that these two areas offer ideal summer feeding areas for Arctic grayling (km 36) and suckers (km 20).

No adult bull or rainbow trout were observed in any of the 15 surveyed tributaries; however, juvenile bull and rainbow trout were observed in tributaries associated with the mainstem as far upstream as tributary 626. No tributaries enter the Table River between tributary 626 and the waterfall located at km 37.6. It would appear that the first set of falls on the mainstem is a barrier to upstream rainbow trout migration thereby eliminating the use of tributaries upstream of km 37.6 by rainbow trout. Bull trout are located as far upstream as 54 km on the mainstem, although, their utilisation of the associated tributaries is unknown. Thorough examination of these tributaries was not undertaken as there is limited ground access to this area for survey crews. Most sites were accessible only by helicopter.

Bull trout were observed in low numbers in both the upper and lower sections. However, a bull trout density of 3.29/km for fish in the 40+ cm size class was observed in the upper section as opposed to a density of 0.3/km for fish in the lower section indicating a much higher use of the upper section by this size class. The large bull trout present in the upper section are probably spawners seeking out preferred spawning habitat, or "staging sites" prior to spawning as outlined by Hass (1997). McPhail and Baxter (1995) identified preferred habitat as having a predominance of small gravel (< 20 mm diameter), relatively low water velocity (0.03 - 0.8 m/s), and proximity to cover. This preferred habitat would likely be the relatively stable flows and reduced sediment content in the upper section as compared to the more turbid lower section. These large piscivorous fish could also be remaining in this area after spawning to feed on the mountain whitefish and Arctic grayling. The densities of these prey are at least four times greater in the upper section as compared to the lower section.

Suckers were observed in high concentrations at two areas of the mainstem. A pronounced specific sucker spike occurs at the 20 km section. Very large schools of suckers were observed in this section. This one kilometre section is essentially a low gradient glide with no cover. The fish may have recently completed spawning; however, it is not known if the fish had spawned in this location or recently moved to it. In addition, a large school of suckers were observed at the 23 km section of the river immediately downstream of the bridge crossing. These fish were observed frequently at this location prior to the July 6 - 19 survey. This site may be an important spawning location for suckers.

The size of Arctic grayling was larger the further upstream they were located. There was a noticeable number of Arctic grayling in the upper area (km 30.0 - 37.6) of the mainstem, especially in the confluence pool of Tributary 605 and the Table River. This occurrence of larger (hence older) Arctic grayling in the upper reaches of a stream has been previously noted by Northcote (1978) and Tack (1980) and is believed to be a component of an Arctic grayling migratory sequence. This sequence suggests that the adult fish migrate to the upper reaches of the stream with sub-adult fish occupying the middle reaches of the river, and finally juveniles inhabiting the lower reaches of the river. In addition, this trend of observing older Arctic grayling in the upper reaches may be attributed to their migration to feeding areas as reported by Armstrong (1982).

Other explanations on why larger Arctic grayling are observed in the upper reaches of a stream may be based on energetics. The similarity between the positions predicted and those selected by the Arctic grayling supports the idea that Arctic grayling choose positions which maximise their net energy rate (Hughes and Dill 1990). There appears to be an important trade-off between the number of prey items that a fish sees, and the proportion of these it is able to capture. The number of prey fish sees increases with water depth and velocity. The upper reaches of the Table River have areas of relatively fast velocity and narrow wetted widths. Salmonids generally move into faster, deeper water as they grow, and change their positions daily and seasonally (N.F. Hughes and L.M. Dill unpubl. data).

Migrations to feeding areas may vary depending on the age of Arctic grayling, type of system in which they overwinter, and the type of system in which they spawn. Arctic grayling that migrate to feeding areas in unsilted rapid-runoff rivers tend to go to different areas, depending on their age and maturity. Juveniles (ages 1 to 3) move into or remain in the lower portions of these rivers and their associated tributaries; the subadults (ages 4, 5, and sometimes 6) tend to move to the middle portions of the river; and post-spawning adults either move upstream to feed in the upper reaches of the river or, if they spawned in the upper reaches, remain there throughout the summer (Armstrong 1982). This theory appears to be related to the Table River as the first 26.7 km of the river was originally identified as a "lower portion" part of the river. The only juvenile Arctic grayling found in the Table River system was within this lower portion (km 26). Therefore, the area in which these juveniles were found may be indicative of a prime feeding area for juvenile Arctic grayling. The majority of the larger Arctic grayling observed in the Table River came from the upper accessible reaches.

Adult and sub-adult Arctic grayling were most often observed in small pools or glides containing at least some large woody debris. The Arctic grayling were usually observed not in the expected debris/cover, but a few metres to the side or behind the debris. Arctic grayling were usually situated very close to the thalweg through the pools, and stationed approximately 10 cm off the bottom. The preferred depth and velocity of Arctic grayling (n=59, fork length > 10 cm) was 136 cm and 0.36 m/sec respectively (Langston 1998). Only sub-adult Arctic grayling were located in water depths less than one metre.

Arctic grayling were not captured/observed in any of the 15 tributaries of the Table River that were surveyed in 1995. It is known that Arctic grayling are found as far upstream as **km** 37.6 of the mainstem. Tributaries 072, 163, 199, 203, 243, 257, 307, 528, 538, and 549 were not electrofished during 1995. It is possible that these 10 tributaries could have contained Arctic grayling within them. More electrofishing effort will have to be completed during the summer of 1996 within these associated tributaries to determine if Arctic grayling are utilising tributaries in the Table River system.

Arctic grayling of the Table River are similar in size at age to Arctic grayling of the Mesilinka River as reported by Koning, Ashley, and Slaney (1995). In addition, the Table River Arctic grayling are comparable in size as the Parsnip River Arctic grayling as reported by Bruce and Starr (1985). Arctic grayling in the Table River were smaller than the Arctic grayling in the Nation River (unpubl. data). These comparisons are based on the number of fish collected for each age group. Some age groups in a system have considerably more fish

samples than the same age group in another system. Size differences of Arctic grayling are likely due to the warmer water temperatures of the Nation River as compared to the other systems (Langston 1992, 1993, 1995; Langston and Zemlak 1994). Warm water systems generally induce the growth rates of fish.

Further information on preferred spawning locations, feeding, and overwintering habitat locations of adult Arctic grayling will be determined by a radio telemetry project to be initiated in the summer of 1996. The radio tracking program will help determine locations of overwintering, spawning, and summer feeding of Arctic grayling in the Table River area. An Arctic grayling genetics study will also be initiated in 1996. This genetic project will determine if there are genetically unique Arctic grayling stocks within the Table River. If unique genetic stocks do occur within the Table River Arctic grayling population, specific protection measures may be required. In addition, rehabilitation of degraded habitat at locations found to be important/critical for each stock encountered may be necessary.

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APPENDIX I

Electrofishing data

KEY FOR THE ELECTROFISHING DATA

TABLE RIVER

SYSTEM	REACH	U.T.M. SITE	SITE	MAP SHEET	DATE	WATER TEMP. (°C)	SURFACE AREA (m)	CREW	DESCRIPTION OF LOCATION	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE (yrs)	REMOVAL METHOD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

1) "SYSTEM" - Gazetted stream name.
2) "REACH" - The homogeneous section of stream where the survey occured.
3) "U.T.M. SITE" - (Universal Transverse Mercator) number that identifies the location of the sampling site.
4) "SITE" - The general area where the survey took place.
5) "MAP SHEET" - The map sheet (1:50,000 NTS) on where the survey took place.
6) "DATE" - Date of the survey.
7) "WATER TEMP." - The water temperature expressed in degrees Celsius at the time of the survey using a hand held alcohol thermometer.
8) "SURFACE AREA" - The surface area of stream sampled expressed in square metres.
9) "CREW" - The initials of the crew members.
10) "DESCRIPTION OF LOCATION" - A decription of the location on where the survey took place.
11) "SPECIES" - Indicates the species code of fish captured.
    - i.e. BB = burbot
    BT = bull trout
    CC = sculpins (general)
    MW = mountain whitefish
    GR = Arctic grayling
    RB = rainbow trout
    SU = sucker (general)
    TR = trout (general)
    sp? = unknown species
12) "LENGTH" - The fork length of a fish expressed in millimetres.
13) "WEIGHT" - The weight of a fish expressed in grams.
14) "AGE" - The age of the fish expressed in years. An age of 0 indicates young of the year fish.
    - 0* indicates that this specific fish was not aged and that it was assigned an age 0 based on the average length of age 0 fish that were properly aged.
15) "REMOVAL METHOD" - Indicates the method used to determine presence/absence (open site), or population estimates (closed site).
    - i.e. PASS # 1 = ..., PASS # 2 = ... , - a two pass method was used and presents what fish species were captured and the number of fish caught (nets used).
    Caught 2 BT and 3 RB - indicates fish species presence and abundance (no nets used).

ELECTROFISHING DATA

SYSTEM: Table River
REACH: # 1
U.T.M.: 10.54712.606290

SITE: mainstem, (3.8 km)
MAP SHEET:
DATE: September 9, 1995

WATER TEMPERATURE: ?°C
SURFACE AREA: 96 m²
CREW: J.F. / S.K.

LOCATION: Electrofished at road crossing, right bank (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	150	20.4	-								

Pass #1 = 3 CC. Pass #2 = 1 BB and 1 CC.

ELECTROFISHING DATA

SYSTEM: Table River
REACH: # 1
U.T.M.: 10.54712.606290

SITE: mainstem, (3.8 km)
MAP SHEET:
DATE: September 9, 1995

WATER TEMPERATURE: ?°C
SURFACE AREA: 176 m²
CREW: J.F. / S.K.

LOCATION: Electrofished at road crossing, left bank (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
MW	55	1.2	-								
RB	38	0.6	0 *								

Pass #1 = 1 MW, 1 RB, and 3 CC. Pass #2 = 1 SU and 2 CC.

ELECTROFISHING DATA

SYSTEM: Table River
REACH: # 1
U.T.M.: 10.54737.606320

SITE: unnamed tributary 072
MAP SHEET:
DATE: August 23, 1995

WATER TEMPERATURE: 9.5°C
SURFACE AREA: 625 m²
CREW: J.F. / A.L.

LOCATION: Electrofished from 75 m below road crossing u/s to above railroad culvert (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 154	WATER TEMPERATURE:	9.0°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	360 m²
U.T.M.:	10.55000.606475	DATE:	August 30, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished from 50 m d/s of train culvert to 70 m u/s of train culvert (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
SU	120	0.7	-	RB	41	0.7	0 *	RB	91	7.7	1
RB	37	0.5	0 *	RB	41	0.7	0 *	RB	93	8.3	1 *
RB	37	0.5	0 *	RB	41	1	0 *	RB	94	9.6	1 *
RB	38	0.5	0 *	RB	42	1.3	0 *	RB	95	8.4	1
RB	38	0.6	0 *	RB	78	5.1	1	RB	103	10.6	1 *
RB	39	0.6	0 *	RB	80	5.2	1	RB	104	11.9	1
RB	39	0.7	0 *	RB	80	5.4	1	RB	104	12.1	1
RB	40	0.6	0 *	RB	86	6.2	1	RB	112	16.2	1
RB	40	0.7	0 *	RB	86	6.5	1	RB	135	26.7	1
RB	40	0.8	0 *	RB	89	6.6	1				
RB	40	0.8	0 *	RB	90	7.7	1				

Pass #1 = 15 RB. Pass #2 = 12 RB and 1 SU. Pass #3 = 3 RB.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 154	WATER TEMPERATURE:	7.0°C
REACH:	# 3	MAP SHEET:		SURFACE AREA:	524 m²
U.T.M.:	10.55010.606496	DATE:	August 31, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished from road crossing to 169 m u/s (stop nets used in the first 100 m).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught. Saw a 160 mm RB @ the 169 m point.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 163	WATER TEMPERATURE:	8.0°C
REACH:	?	MAP SHEET:		SURFACE AREA:	100 m²
U.T.M.:	10.55109.606425	DATE:	August 29, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished from second road crossing to 100 m u/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (9.6 km)	WATER TEMPERATURE:	?°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	90 m²
U.T.M.:	10.55051.606475	DATE:	September 10, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished at road crossing, right bank (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Pass #1 = 31 CC. Pass #2 = 8 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (9.6 km)	WATER TEMPERATURE:	?°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	96 m²
U.T.M.:	10.55051.606475	DATE:	September 10, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished at road crossing, left bank (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Pass #1 = 6 CC. Pass #2 = 2 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (11 km to 17 km)	WATER TEMPERATURE:	?°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	2,750 m²
U.T.M.:	10.55305.606620	DATE:	August 29, 1995	CREW:	B.B. / S.K.

LOCATION: Electrofished the mainstem and sidechannels at each km sign from 17 km to 11 km (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
MW	44	0.9	-								
MW	48	1.3	-								
MW	52	1.4	-								
MW	53	1.2	-								
MW	170	-	-								
MW	175	58.8	-								
RB	30	-	0 *								
RB	36	0.9	0 *								
RB	120	-	2 *								
RB	132	22.9	2								

Site #1 (17 km) = 0 fish. Site #2 (16.8 km) = 0 fish. Site #3 (15.8 km) = 3 MW. Site #4 (13 km) = 11 CC. Site #5 (12.2 km) = 2 RB & 1 MW. Site #6 (11.9 km) = 4 MW. Site #7 (11 km), Side Channel = 4 RB and 6 MW. Many sculpins captured but not enumerated.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 199	WATER TEMPERATURE:	7.0°C
REACH:	?	MAP SHEET:		SURFACE AREA:	240 m²
U.T.M.:	10.55215.606490	DATE:	August 29, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished u/s from road crossing (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught. Suspect beaver dams d/s are barriers to fish passage.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 257	WATER TEMPERATURE:	9.0°C
REACH:	?	MAP SHEET:		SURFACE AREA:	400 m²
U.T.M.:	10.55360.606685	DATE:	August 30, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished from train culvert (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Caught 2 Suckers (120 - 160 mm long).

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 257	WATER TEMPERATURE:	8.0°C
REACH:	?	MAP SHEET:		SURFACE AREA:	165 m²
U.T.M.:	10.55375.606757	DATE:	August 30, 1995	CREW:	J.D. / A.L.

LOCATION: Electrofished from road crossing to 165 m u/s (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 293	WATER TEMPERATURE:	8.0°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	5,912.5 m²
U.T.M.:	10.55445 606815	DATE:	August 17, 1995	CREW:	B.B. / M.H.

LOCATION: Electrofished from road crossing to 550 m u/s (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	130	-	1 *								
BT	-	-	-								
RB	110	-	1 *								
RB	89	7.6	1 *								
RB	-	-	-								

Caught 2 BT, 3 RB, and about 20 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 293	WATER TEMPERATURE:	9.0°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	600 m²
U.T.M.:	10.55475 606737	DATE:	September 6, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished from train bridge to 120 m d/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	68	3	0 *	RB	38	0.6	0 *	RB	93	9	1 *
BT	68	3.3	0	RB	39	0.5	0 *	RB	93	9.6	1 *
BT	70	3.5	0	RB	39	0.7	0 *	RB	94	8.3	1
RB	32	0.4	0 *	RB	39	0.7	0 *	RB	100	10.5	1
RB	33	0.4	0 *	RB	40	0.7	0 *	RB	105	12.9	1
RB	36	0.6	0 *	RB	40	0.7	0 *	RB	111	14.6	1
RB	36	0.8	0 *	RB	40	0.9	0 *	RB	124	19.7	1
RB	37	0.4	0 *	RB	41	0.5	0 *	RB	125	20	1
RB	37	0.5	0 *	RB	41	0.8	0 *	RB	154	42.5	2
RB	37	0.6	0 *	RB	41	0.8	0 *	RB	164	50	2
RB	37	0.6	0 *	RB	41	0.8	0 *	RB	185	70	2
RB	37	0.7	0 *	RB	43	0.8	0 *	RB	185	74	2
RB	38	0.5	0 *	RB	91	7.9	1	RB	186	85	3

Pass #1 = 34 RB, 3 BT, and 51 CC. Pass #2 = 2 RB and 27 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 353	WATER TEMPERATURE:	6.0°C
REACH:	#1	MAP SHEET:		SURFACE AREA:	483 m²
U.T.M.:	10.55715 606719	DATE:	September 21, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished from the confluence with the Table River upstream 70 m (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
RB	32	0.7	0 *								
RB	34	0.4	0 *								
RB	38	1	0 *								
RB	40	1.1	0 *								
RB	45	0.9	0 *								
RB	45	1.1	0 *								

Pass #1 = 4 RB and 9 CC. Pass # 2 = 2 RB and 7 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 404	WATER TEMPERATURE:	7.5°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	660 m²
U.T.M.:	10.55895.606783	DATE:	August 23, 1995	CREW:	M.H. / A.L.

LOCATION: Electrofished from the mouth to 200 m u/s (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
RB	28	-	0 *								

Turned 3 other RB (young of the year), but could not net them. Also turned 1 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (22.6 km)	WATER TEMPERATURE:	?°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	50 m²
U.T.M.:	10.55892.606792	DATE:	September 20, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished right side of bank on the mainstem, 100 m below train bridge (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Pass #1 = 9 CC. Pass #2 = 3 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (22.8 km)	WATER TEMPERATURE:	10.5°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	660 m²
U.T.M.:	10.55892.606810	DATE:	September 12, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished the mainstem at 22.8 km in the left side channel pool u/s from bridge (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Only one pass = 2 juvenile BB and 26 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 427	WATER TEMPERATURE:	?°C
REACH:	#1	MAP SHEET:		SURFACE AREA:	200 m²
U.T.M.:	10.55926.606878	DATE:	August 15, 1995	CREW:	B.B. / M.H.

LOCATION: Electrofished from the mouth working u/s 50 m (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Caught 1 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 427	WATER TEMPERATURE:	?°C
REACH:	?	MAP SHEET:		SURFACE AREA:	720 m²
U.T.M.:	10.55882.606930	DATE:	August 16, 1995	CREW:	B.B. / M.H.

LOCATION: Electrofished from the road bridge crossing working u/s 160 m (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Caught 4 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 427	WATER TEMPERATURE:	8.5°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	2,000 m²
U.T.M.:	10.55913.606891	DATE:	August 31, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished side and back channels near the mainstem and by the mouth of the tributary (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
? sp.	20	-	0 *								
BT	90	-	1 *								

Total fish caught = 5 MW, 5 RB (0+), 10 CC, 1 BT, and 1 small unknown transparent fish with no adipose or dorsal fin.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 431	WATER TEMPERATURE:	8.0°C
REACH:	?	MAP SHEET:		SURFACE AREA:	624 m²
U.T.M.:	10.56154.606942	DATE:	August 24, 1995	CREW:	J.D. / J.F. / A.L.

LOCATION: Electrofished at 250 m d/s from road crossing for a length of 189 m (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 431	WATER TEMPERATURE:	11.0°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	300 m²
U.T.M.:	10.55969.606885	DATE:	September 8, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished braided areas approximately 600 m u/s from the mouth (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Total fish caught = 12 juvenile suckers (all about 46 mm long).

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (26 to 27 km)	WATER TEMPERATURE:	9.0°C
REACH:	# 2 & 3	MAP SHEET:		SURFACE AREA:	5,000 m²
U.T.M.:	10.56022.607029	DATE:	September 28, 1995	CREW:	J.F./S.K./A.L./T.M.

LOCATION: Electrofished on one shore for a km, approx. 5 m wide (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	-	-	-	BT	71	3.3	0	GR	65	2.4	0
BT	59	1.9	0 *	BT	71	3.4	0	GR	67	2.3	0
BT	61	2.1	0 *	BT	71	3.6	0	GR	67	2.5	0
BT	64	2.8	0	BT	71	3.7	0	GR	68	2.5	0
BT	66	2.9	0	BT	79	4.4	0	GR	70	2.8	0
BT	67	2.9	0	GR	59	1.5	0	GR	71	2.7	0
BT	68	3	0	GR	60	1.7	0	RB	41	0.7	0 *
BT	68	3	0	GR	63	2	0	RB	44	0.8	0 *
BT	68	3	0	GR	63	2	0	RB	47	1	0
BT	68	3.1	0	GR	63	2.1	0	RB	56	1.8	0
BT	69	3.3	0	GR	64	2.1	0	RB	126	21.4	1
BT	70	3.7	0	GR	65	2.3	0	RB	205	45.6	2 *

Total fish caught = 16 BT, 13 GR, 1 BB, and 6 RB.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (26.5 km)	WATER TEMPERATURE:	9.0°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	112 m²
U.T.M.:	10.56023.607030	DATE:	September 28, 1995	CREW:	J.F./S.K./A.L./T.M.

LOCATION: Electrofished a small section of the mainstem (stop nets used), only one pass.

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	200	44.4	-								
SU	97	9.2	-								

Pass #1 = 1 BB and 1 SU.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	tributary 496, (Boulder C.)	WATER TEMPERATURE:	?°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	660 m²
U.T.M.:	10.56232.606969	DATE:	September 8, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished a small area from the bridge u/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	156	22.3	-								
BB	168	28.9	-								
BB	175	32	-								
BB	189	36.8	-								
BB	235	69.5	-								
BT	53	1.5	0 *								
BT	224	129.2	2								
MW	143	29.1	-								
RB	164	40.4	1								
RB	183	75.3	2								

Pass #1 = 1 RB, 1 MW, 2 BT, 3 BB, and 29 CC. Pass #2 = 1 RB, 2 BB, and 23 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	tributary 496, (Boulder C.)	WATER TEMPERATURE:	?°C
REACH:	# 4	MAP SHEET:		SURFACE AREA:	N/A
U.T.M.:	10.56809.606786	DATE:	September 29, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Attempted to electrofish a small area approximately 2 km u/s from the major fork, (on the north stream).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

No fish caught due to electroshocker problems. One live BT observed. Identified one dead BT found on shore.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 527	WATER TEMPERATURE:	7.5°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	520 m²
U.T.M.:	10.56242.607150	DATE:	September 29, 1995	CREW:	J.F./S.K./A.L./T.M.

LOCATION: Electrofished from the mouth to 100 m u/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	210	59	-								
BT	63	3	0 *								
MW	70	2.3	-								
MW	75	2.8	-								
RB	84	4.5	0								
RB	95	6.5	1								

Pass #1 = 2 MW, 2 RB, and 43 CC. Pass #2 = 1 BT, 1 BB, and 31 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (34.1 km)	WATER TEMPERATURE:	7.5°C
REACH:	# 3	MAP SHEET:		SURFACE AREA:	approx. 250 m²
U.T.M.:	10.56470.607380	DATE:	September 26, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished the mainstem approx. 250 m d/s of 605 confluence (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	170	29	-								
BB	180	29.9	-								
BB	200	48.8	-								
BB	220	63.1	-								
MW	60	2.4	-								

Pass #1 = 3 BB, 1 MW, and 59 CC. Pass #2 = 1 BB and 33 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (34.1 to 34.5 km)	WATER TEMPERATURE:	?°C
REACH:	# 3	MAP SHEET:		SURFACE AREA:	approx. 500 m²
U.T.M.:	10.56485.607399	DATE:	September 26, 1995	CREW:	J.F. / S.K. / A.L.

LOCATION: Electrofished the mainstem, along with a side channel, and 30 m of tributary 605 (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Total fish caught = 2 RB (about 150 mm long), and many sculpins (> 200 mm long).

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 605	WATER TEMPERATURE:	7.5°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	2,750 m²
U.T.M.:	10.56475.607416	DATE:	August 24, 1995	CREW:	B.B. / M.H. / S.K.

LOCATION: Electrofished from the mouth and worked u/s for 550 m (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	34	0.3	0 *	BT	94	7.3	1				
BT	37	0.4	0 *	BT	197	70	1				
BT	45	0.9	0 *	RB	40	0.6	0 *				
BT	45	1	0 *	RB	56	2.2	0				
BT	45	1.1	0 *	TR	20	-	0 *				
BT	46	0.9	0 *								
BT	47	1.1	0 *								
BT	50	1.3	0 *								
BT	50	1.3	0 *								
BT	88	5.8	1								

Total fish caught = 12 BT, 2 RB, and 1 unidentified trout.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 610	WATER TEMPERATURE:	?°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	550 m²
U.T.M.:	10.56555.607481	DATE:	September 1, 1995	CREW:	B.B. and ?

LOCATION: Electrofished from road crossing to 110 m u/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	172	34	-	BB	240	82.4	-				
BB	185	36.7	-	BT	185	63.5	2				
BB	195	36	-	BT	185	66.7	1				
BB	205	44.5	-	MW	64	2.1	-				
BB	215	44	-	RB	195	84.2	2				
BB	225	67	-	RB	222	135	2				
BB	225	73	-								
BB	230	74	-								
BB	235	69.3	-								
BB	235	76.1	-								

Pass #1 = 1 RB, 2 BT, 6 BB, and 118 CC. Pass #2 = 1 RB, 1 MW, 5 BB, and 60 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 610	WATER TEMPERATURE:	?°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	approx. 4,500 m²
U.T.M.:	10.56595.607588	DATE:	September 1, 1995	CREW:	J.D. / A.L.

LOCATION: Electrofished from 1 km u/s of lower road crossing to 2.5 km u/s, randomly selected side to shock (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE

Total fish caught = 25 sculpins (from 15-90 mm long), 1 RB (160 mm long), and 1 MW (45 mm long).

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 626	WATER TEMPERATURE:	?°C
REACH:	# 1	MAP SHEET:		SURFACE AREA:	approx. 1,056 m²
U.T.M.:	10.56564.607380	DATE:	August 22 and 23, 1995	CREW:	B.B. / J.F. / S.K.

LOCATION: Electrofished from the mouth and shocked 150 m u/s (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	44	2.3	0 *	BT	98	9.8	1 *	RB	73	4.7	1
BT	45	1.2	0 *	BT	99	10.2	1	RB	74	4.7	1
BT	45	1.5	0 *	BT	135	24.6	1 *	RB	74	5.6	1
BT	47	0.7	0 *	BT	160	143	3	RB	75	6.7	0
BT	48	0.8	0 *	CC	30	0.3	-	RB	77	5.8	1
BT	49	1.6	0 *	CC	37	0.7	-	RB	78	5.6	1
BT	49	1.8	0 *	CC	37	0.9	-	RB	80	5.8	0
BT	50	1.5	0 *	CC	40	0.7	-	RB	80	6.2	1
BT	51	1.8	0 *	CC	41	1.1	-	RB	81	5.8	1
BT	55	2.1	0 *	CC	44	1.5	-	RB	82	6.5	1
BT	84	5.6	1	CC	75	4.4	-	RB	87	7.3	1
BT	84	5.7	1	CC	90	8.6	-	RB	87	7.7	1
BT	86	6.6	1 *	RB	26	0.8	0 *	RB	110	14.2	2
BT	87	6.8	1	RB	27	0.9	0 *	RB	110	16.2	2 *
BT	89	9.1	1 *	RB	27	1	0 *	RB	113	14.8	2
BT	90	9.7	1	RB	29	0.6	0 *	RB	116	17.8	2
BT	91	7.5	1	RB	67	5	0	RB	116	19	2
BT	92	7.9	1	RB	68	3.8	0	RB	143	31.7	2
BT	97	8.7	1	RB	69	3.8	1	RB	147	37.9	2
BT	97	8.8	1	RB	69	4.8	1				
BT	97	9.4	1	RB	73	4	1				

Pass #1 = 19 RB, 17 BT, and 2 CC. Pass #2 = 9 RB, 8 BT, and 6 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	unnamed tributary 626	WATER TEMPERATURE:	?°C
REACH:	# 2	MAP SHEET:		SURFACE AREA:	approx. 835 m²
U.T.M.:	10.56671.607261	DATE:	August 22, 1995	CREW:	M.H. / A.L.

LOCATION: Electrofished from 31 m downstream of road culvert working upstream end of train culver (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	117	-	1								
BT	132	-	1								

Total fish caught = 2 BT.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (35.6 km)	WATER TEMPERATURE:	?°C
REACH:	# 4	MAP SHEET:		SURFACE AREA:	approx. 3,500 m²
U.T.M.:	10.56594.607377	DATE:	August 18, 1995	CREW:	B.B. / M.H.

LOCATION: Electrofished from the road crossing and shocked 700 m u/s (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BB	184	29.8	-	RB	116	17.1	1				
BB	234	70.7	-	RB	120	-	1 *				
BT	107	14.7	1	RB	154	38	2				
BT	168	42.9	1								
BT	189	71.3	2								

Total fish caught = 3 RB, 3 BT, and 2 BB.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (38.5 km)	WATER TEMPERATURE:	7.5°C
REACH:	#4	MAP SHEET:		SURFACE AREA:	287 m²
U.T.M.:	10.56818.607388	DATE:	September 27, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished above the falls, end of cutblock (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	75	4.3	0								
BT	79	4.9	0 *								
BT	80	4.6	0								
BT	130	21.7	1 *								
BT	137	23	1 *								

Pass #1 = 3 BT and 22 CC. Pass #2 = 2 BT and 16 CC.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (50.8 km)	WATER TEMPERATURE:	7.0°C
REACH:	#6	MAP SHEET:		SURFACE AREA:	261 m²
U.T.M.:	10.57754.607521	DATE:	September 29, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished a small area 45 m long (stop nets used).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	55	1.6	0 *								

Pass #1 = 1 BT. Pass #2 = no fish.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (50.8 km)	WATER TEMPERATURE:	7.0°C
REACH:	#6	MAP SHEET:		SURFACE AREA:	1,160 m²
U.T.M.:	10.57754.607521	DATE:	September 29, 1995	CREW:	J.F. / S.K.

LOCATION: Electrofished for 200 m (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	55	1.1	0 *								
BT	55	1.9	0 *								
BT	105	9.7	1								
BT	105	12.4	1								
BT	215	87	3								
BT	220	120	3								
BT	240	140.9	3								
BT	255	168.7	4								
BT	260	189.7	4								

Total fish caught = 9 BT. Pass #1 = 1 BT. Pass #2 = no fish.

ELECTROFISHING DATA

SYSTEM:	Table River	SITE:	mainstem, (53.9 km)	WATER TEMPERATURE:	?°C
REACH:	# 7	MAP SHEET:		SURFACE AREA:	210 m²
U.T.M.:	10.58040.607670	DATE:	August 15, 1995	CREW:	B.B. / M.H.

LOCATION: Electrofished the mainstem, just below the train tunnel (presence/absence).

SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE	SPECIES	LENGTH (mm)	WEIGHT (g)	AGE
BT	196	-	3 *								

Total fish caught = 1 BT (very robust).

APPENDIX II

Electrofishing summary and population estimates

KEY FOR THE ELECTROFISHING SUMMARY

TABLE RIVER

STREAM NAME	DATE (y/m/d)	REACH #	U.T.M. SITE	WATER TEMP. (°C)	SURFACE AREA (m^2)	METHOD	SPECIES	# OF FISH CAP.	# OF EST. FISH	X FL (mm)	FL RANGE (mm)	X WT (g)	WT RANGE (g)	POP. EST. DENSITY (# / m^2)	POP. EST. BIOMASS (g)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

1) "STREAM NAME" - Gazetted or alias stream name.

2) "DATE" - Date of the survey entered in the form of YMD (year, month, day).

3) "REACH" - The homogeneous section of stream where the survey occured.

4) "U.T.M. SITE" - (Universal Transverse Mercator) number that identifies the location of the sampling site.

5) "WATER TEMP." - The temperature of the water expressed in degrees Celsius at the time of the survey using a hand held alcohol thermometer.

6) "SURFACE AREA" - The surface area of stream sampled expressed in square metres.

7) "METHOD" - The method used to determine fish presence.
- ie. P.A. = Presence / Absence - no stop nets used, open site.
P.E. = Population Estimate - stop nets used, closed site, minimum 2 pass removal method.

8) "SPECIES" - Indicates the species code of fish captured. An age of 0+ indicates young of the year fish.
- ie. BB = burbot
BT 0+ = bull trout, young of the year
BT = bull trout, one year and older
CC = sculpins (general)
GR 0+ = Arctic grayling, young of the year
MW = mountain whitefish
RB 0+ = rainbow trout, young of the year
RB = rainbow trout, one year and older
SU = sucker (general)
sp ? = unknown species
TR = trout (general)

9) "# OF FISH CAP." - The number of fish captured during sampling.

10) "# OF EST. FISH" - The number of estimated fish in a certain area using the Microfish 3.0 Program based on the # of fish captured. Fish estimates are only determined for P.E.

11) "X FL" - The mean fork length of a fish expressed in millimetres.

12) "FL RANGE" - The range of fork lengths from the smallest to the largest expressed in millimetres.

13) "X WT" - The mean weight of a fish expressed in grams.

14) "WT RANGE" - The range of weights from the smallest to the largest expressed in grams.

15) "POP. EST., DENSITY" - The number of estimated fish for an area divided by the surface area and is expressed in the number of fish per square metre.

16) "POP. EST., BIOMASS" - The density divided by the mean fish weight and is expressed in grams of fish per square metre.

STREAM NAME	DATE (y/m/d)	REACH #	U.T.M. SITE	WATER TEMP. (°C)	SURFACE AREA (m^2)	METHOD	SPECIES	# OF FISH CAP.	# OF EST. FISH	X FL (mm)	FL RANGE (mm)	X WT (g)	WT RANGE (g)	POP. EST. DENSITY (# / m^2)	POP. EST. BIOMASS (g / m^2)
Mainstem (3.8 km)	950909	1	10.54712.606290	?	96	P.E.	BB	1	1**	-	-	-	-	0.010	-
	"	"	"	"	"	"	CC	4	4	-	-	-	-	0.042	-
Mainstem (3.8 km)	950909	1	10.54712.606290	?	176	P.E.	CC	5	6	-	-	-	-	0.034	-
	"	"	"	"	"	"	MW	1	1**	55	-	1.2	-	0.006	0.007
	"	"	"	"	"	"	RB 0+	1	1**	38	-	0.6	-	0.006	0.003
	"	"	"	"	"	"	SU	1	1**	-	-	-	-	-	-
Tributary 072	950823	1	10.54737.606320	9.5	625	P.A.	NONE	0	N/A	-	-	-	-	N/A	N/A
Tributary 154	950830	2	10.55000.606475	9.0	360	P.E.	RB 0+	14	16	40	37 - 42	0.7	0.5 - 1.3	0.044	0.031
	"	"	"	"	"	"	RB	16	16	95	78 - 135	9.6	5.1 - 26.7	0.044	0.427
	"	"	"	"	"	"	SU	1	1**	120	-	0.7	-	0.003	0.002
Tributary 154	950831	3	10.55010.606496	7.0	524	P.E.	NONE	0	0	-	-	-	-	0.000	0.000
Tributary 163	950829	-	10.55109.606425	8.0	100	P.E.	NONE	0	0	-	-	-	-	0.000	0.000
Mainstem (9.6 km)	950910	1	10.55051.606475	?	90	P.E.	CC	39	45	-	-	-	-	0.500	-
Mainstem (9.6 km)	950910	1	10.55051.606475	?	96	P.E.	CC	8	9	-	-	-	-	0.094	-
Mainstem (11.0 to 17.0 km)	950829	2	10.55305.606620	-	2,750	P.A.	MW	6	N/A	90	44 - 175	13	0.9 - 58.8	N/A	N/A
	"	"	"	"	"	"	RB 0+	2	"	33	30 - 36	0.9	-	"	"
	"	"	"	"	"	"	RB	2	"	126	120 - 132	22.9	-	"	"
Tributary 199	950829	-	10.55215.606490	7.0	240	P.E.	NONE	0	0	-	-	-	-	0	0
Tributary 257	950830	-	10.55360.606685	9.0	400	P.E.	SU	2	2**	-	-	-	-	0.005	-
Tributary 257	950830	-	10.55375.606757	8.0	165	P.A.	NONE	0	N/A	-	-	-	-	N/A	N/A
Tributary 293	950817	1	10.55445.606815	8.0	5,913	P.A.	BT	1	N/A	153	-	32.8	-	N/A	N/A
	"	"	"	"	"	"	RB	1	"	89	-	7.6	-	"	"
Tributary 293	950906	1	10.55475.606737	9.0	600	P.E.	BT	3	3*	69	68 - 70	3.3	3.0 - 3.5	0.005	0.017
	"	"	"	"	"	"	CC	78	103	-	-	-	-	0.172	-
	"	"	"	"	"	"	RB 0+	22	22	38	32 - 43	0.6	0.4 - 0.8	0.037	0.022
	"	"	"	"	"	"	RB	14	14*	129	91 - 186	31	7.9 - 85	0.023	0.723

STREAM NAME	DATE (y/m/d)	REACH #	U.T.M. SITE	WATER TEMP. (°C)	SURFACE AREA (m^2)	METHOD	SPECIES	# OF FISH CAP.	# OF EST. FISH	X FL (mm)	FL RANGE (mm)	X WT (g)	WT RANGE (g)	POP. EST. DENSITY (# / m^2)	POP. EST. BIOMASS (g / m^2)
Tributary 353	950921	1	10.55715.606719	-	483	P.E.	CC	16	24	-	-	-	-	0.050	-
	"	"	"	"	"	"	RB 0+	6	6	39	32 - 45	0.9	0.7 - 1.1	0.012	0.011
Tributary 404	950823	1	10.55895.606783	7.5	660	P.A.	CC	1	N/A	-	-	-	-	N/A	N/A
	"	"	"	"	"	"	RB 0+	4	"	28	-	-	-	"	"
Mainstem (22.6 km)	950920	2	10.55892.606792	-	50	P.E.	CC	12	12	-	-	-	-	0.240	-
Mainstem (22.8 km)	950912	2	10.55892.606810	10.5	660	P.A.	BB	2	N/A	-	-	-	-	N/A	N/A
	"	"	"	"	"	"	CC	26	"	-	-	-	-	"	"
Tributary 427	950815	1	10.55926.606878	-	200	P.E.	CC	1	1*	-	-	-	-	0.005	-
Tributary 427	950816	-	10.55882.606930	-	720	P.A.	CC	4	N/A	-	-	-	-	N/A	N/A
Tributary 427	950831	1	10.55913.606891	8.5	2,000	P.A.	BT	1	N/A	90	-	-	-	N/A	N/A
	"	"	"	"	"	"	CC	10	"	-	-	-	-	"	"
	"	"	"	"	"	"	MW	5	"	-	-	-	-	"	"
	"	"	"	"	"	"	RB 0+	5	"	-	-	-	-	"	"
	"	"	"	"	"	"	sp ?	1	"	20	-	-	-	"	"
Tributary 431	950824	-	10.56154.606942	8.0	624	P.A.	NONE	0	N/A	-	-	-	-	N/A	N/A
Tributary 431	950908	1	10.55969.606885	11.0	300	P.A.	SU	12	N/A	46	-	-	-	N/A	N/A
Mainstem (26.0 to 27.0 km)	950928	1 & 2	10.56022.607029	9.0	5,000	P.A.	BB	1	N/A	-	-	-	-	N/A	N/A
	"	"	"	"	"	"	BT 0+	16	"	68	59 - 79	3.1	1.9 - 4.4	"	"
	"	"	"	"	"	"	GR 0+	13	"	65	59 - 71	2.2	1.5 - 2.8	"	"
	"	"	"	"	"	"	RB 0+	4	"	47	41 - 56	1.1	0.7 - 1.8	"	"
	"	"	"	"	"	"	RB	2	"	166	126 - 205	33.5	21.4 - 45.6	"	"
Mainstem (26.5 km)	950928	1	10.56023.607030	9.0	112	P.A.	BB	1	N/A	200	-	44.4	-	N/A	N/A
	"	"	"	"	"	"	SU	1	"	97	-	9.2	-	"	"
Tributary 496	950908	1	10.56232.606969	-	660	P.E.	BB	5	5	185	156 - 235	37.9	22.3 - 69.5	0.008	0.287
	"	"	"	"	"	"	CC	52	112	-	-	-	-	0.170	-
	"	"	"	"	"	"	MW	1	1*	143	-	29.1	-	0.002	
	"	"	"	"	"	"	RB	2	2	174	164 - 183	57.9	40.4 - 75.3	0.003	0.175
Tributary 496	950929	4	10.56809.606786	Electroshocker not working, no attempt at shocking. Identified one dead bull trout on shore.											

STREAM NAME	DATE (y/m/d)	REACH #	U.T.M. SITE	WATER TEMP. (°C)	SURFACE AREA (m^2)	METHOD	SPECIES	# OF FISH CAP.	# OF EST. FISH	X FL (mm)	FL RANGE (mm)	X WT (g)	WT RANGE (g)	POP. EST. DENSITY (# / m^2)	EST. BIOMASS (g / m^2)
Tributary 527	950929	1	10.56242.607150	7.5	520	P.E.	BB	1	1**	210	-	59	-	0.002	0.113
	"	"	"	"	"	"	BT	1	1**	63	-	3	-	0.002	0.006
	"	"	"	"	"	"	CC	74	138	-	-	-	-	0.265	-
	"	"	"	"	"	"	MW	2	2*	73	70 - 75	2.6	2.3 - 2.8	0.004	0.010
	"	"	"	"	"	"	RB 0+	1	1*	84	-	4.5	-	0.002	0.009
	"	"	"	"	"	"	RB	1	1*	95	-	6.5	-	0.002	0.013
Mainstem (34.1 km)	950926	3	10.56470.607380	7.5	250	P.E.	BB	4	4	192.5	170 - 220	42.7	29 - 63.1	0.016	0.683
	"	"	"	"	"	"	CC	92	128	-	-	-	-	0.512	-
	"	"	"	"	"	"	MW	1	1*	60	-	2.4	-	0.004	0.010
Mainstem (34.1 to 34.5 km)	950926	3	10.56485.607399	-	500	P.A.	CC	many	N/A	200	-	-	-	N/A	N/A
	"	"	"	"	"	"	RB	2	"	150	-	-	-	"	"
Tributary 605	950824	1	10.56475.607416	7.5	2,750	P.A.	BT 0+	9	N/A	44	34 - 50	0.9	0.3 - 1.3	N/A	N/A
	"	"	"	"	"	"	BT	3	"	126	88 - 197	27.7	5.8 - 70	"	"
	"	"	"	"	"	"	RB 0+	2	"	48	40 - 56	1.4	0.6 - 2.2	"	"
	"	"	"	"	"	"	TR	1	"	20	-	-	-	"	"
Tributary 610	950901	1	10.56555.607481	-	550	P.E.	BB	11	16	215	172 - 240	57.9	34 - 82.4	0.029	1.684
	"	"	"	"	"	"	BT	2	2*	185	185 - 185	65.1	63.5 - 66.7	0.004	0.237
	"	"	"	"	"	"	CC	178	236	-	-	-	-	0.429	-
	"	"	"	"	"	"	MW	1	1**	64	-	2.1	-	0.002	0.004
	"	"	"	"	"	"	RB	2	2	209	195 - 222	109.6	84.2 - 135	0.004	0.399
Tributary 610	950901	1	10.56595.607588	-	4,500	P.A.	CC	25	N/A	-	15 - 90	-	-	N/A	N/A
	"	"	"	"	"	"	MW	1	"	45	-	-	-	"	"
	"	"	"	"	"	"	RB	1	"	160	-	-	-	"	"
Tributary 626	950822	1	10.56564.607380	-	1,056	P.E.	BT 0+	10	12	48	44 - 55	1.5	0.7 - 2.3	0.011	0.017
	"	"	"	"	"	"	BT	15	15	99	84 - 160	18.2	5.6 - 143	0.014	0.259
	"	"	"	"	"	"	CC	8	40	49	30 - 90	2.3	0.3 - 8.6	0.038	0.087
	"	"	"	"	"	"	RB 0+	6	6	41	26 - 68	2	0.6 - 5	0.006	0.011
	"	"	"	"	"	"	RB	22	28	92	69 - 147	10.8	3.8 - 37.9	0.027	0.286
Tributary 626	950822	2	10.56671.607261	-	835	P.A.	BT	2	N/A	125	-	-	-	N/A	N/A
Mainstem (35.6 km)	950818	4	10.56594.607377	-	3,500	P.A.	BB	2	N/A	209	184 - 234	50.3	29.8 - 70.7	N/A	N/A
	"	"	"	"	"	"	BT	3	"	155	107 - 189	42.9	14.7 - 71.3	"	"
	"	"	"	"	"	"	RB	3	"	130	116 - 154	27.6	17.1 - 38	"	"

STREAM NAME	DATE (y/m/d)	REACH #	U.T.M. SITE	WATER TEMP. (°C)	SURFACE AREA (m^2)	METHOD	SPECIES	# OF FISH CAP.	# OF EST. FISH	X FL. (mm)	FL. RANGE (mm)	X WT (g)	WT RANGE (g)	POP EST. DENSITY (# / m^2)	POP EST. BIOMASS (g / m^2)
Mainstem (38.5 km)	950927	4	10.56818.607388	7.5	287	P.E.	BT 0+	3	3	78	75 - 80	4.6	4.3 - 4.9	0.010	0.048
	"	"	"	"	"	"	BT	2	2	134	130 - 137	22.4	21.7 - 23	0.007	0.156
	"	"	"	"	"	"	CC	38	66	-	-	-	-	0.230	-
Mainstem (50.8 km)	950929	6	10.57754.607521	7.0	261	P.E.	BT	1	1*	55	-	1.6	-	0.004	0.006
Mainstem (50.8 km)	950929	6	10.57754.607521	7.0	1,160	P.A.	BT 0+	2	N/A	55	55 - 55	1.5	1.1 - 1.9	N/A	N/A
	"	"	"	"	"	"	BT	7	"	200	105 - 260	104.1	9.7 -189.7	"	"
Mainstem (54 km)	950815	7	10.58040.607670	6.0	210	P.A.	BT	1	N/A	196	-	-	-	N/A	N/A

"# OF EST. FISH" - indicates a population estimate using the Microfish 3.0 Program.

"# OF EST. FISH*" - indicates a population estimate using the following equation:

N = A/((1-B)/A), where A = the number of fish removed (captured) on the first pass, and
B = the number of fish removed (captured) on the second pass.

"# OF EST. FISH**" - indicates a population error (a maximum-likelihood estimation is not possible due to only 1 fish being caught on all passes.
- as a result, the population estimate was based on the actual number of fish captured.

" - " indicates that a length or weight was not taken for a certain fish or that a water temperature was not taken.

APPENDIX III

Single pass underwater fish count data

Single pass underwater fish count data

Location	Width	Visibility	Observed Fish Count							Expanded Fish Count					
(km)	(m)	(m)	BT	GR	WG	RB	SU	NSC	Total/km	BT	GR	WG	RB	SU	NSC Total/km
36-35	20	4	0	18	138	2	0	0	316	0	45.0	345	5.0	0.0	0.0 790.0
35-34	20	4	0	17	84	0	1	0	102	0	21.3	105	0	1.3	0 127.5
34-33	25	4	4	16	167	3	0	0	190	6.3	25.0	261	4.7	0	0 296.9
33-32	24	4	2	13	173	3	0	0	191	3	19.5	260	4.5	0	0 286.5
32-31	16	4	1	15	173	5	0	0	194	1	15.0	173	5	0	0 194.0
31-30	20	4	0	16	217	0	0	0	233	0	20.0	271	0	0	0 291.3
30-29	15	4	0	17	162	1	0	0	180	0	17.0	162	1	0	0 180.0
29-28	17		0	0	0	0	0	0	0	0	0.0	0	0	0	0 0.0
28-27	22		0	0	0	0	0	0	0	0	0.0	0	0	0	0 0.0
27-26	25		0	0	0	0	0	0	0	0	0.0	0	0	0	0 0.0
26-25	19		0	0	0	0	0	0	0	0	0.0	0	0	0	0 0.0
25-24	20		0	0	0	0	0	0	0	0	0.0	0	0	0	0 0.0
24-23	20	3.5	2	13	448	7	21	0	491	2.9	18.6	640	10	30	0 701.4
23-22	22	3.5	2	4	72	4	70	0	152	3.1	6.3	113	6.3	110	0 238.9
22-21	21	3.5	1	5	81	2	65	0	154	1.5	7.5	122	3	98	0 231.0
21-20	22	3.5	1	5	50	1	33	0	90	1.6	7.9	78.6	1.6	52	0 141.4
20-19	30	2.5	0	1	75	0	66	0	142	0	3.0	225	0	198	0 426.0
19-18	27	2.5	0	3	20	0	32	0	55	0	8.1	54	0	86	0 148.5
18-17	25	2.5	1	1	41	0	19	0	62	2.5	2.5	103	0	48	0 155.0
1716	25	3	1	2	112	4	39	0	158	2.1	4.2	233	8.3	81	0 329.2
16-15	27	3	0	1	60	0	29	0	90	0	2.3	135	0	65	0 202.5
15-14	25	3	1	1	22	2	53	0	79	2.1	2.1	45.8	4.2	110	0 164.6
1413	17	3	2	2	85	3	29	0	121	2.8	2.8	120	4.3	41	0 171.4
13-12	18	3	1	0	92	0	24	0	117	1.5	0.0	138	0	36	0 175.5
12-11	21	3	0	0	53	1	46	0	100	0	0.0	92.8	1.8	81	0 175.0
11-10	30	3	0	2	62	0	22	1	87	0	5.0	155	0	55	2.5 217.5
10-9	30	3.5	1	1	13	3	32	0	50	2.1	2.1	27.9	6.4	69	0 107.1
9-8	29	3.5	1	2	22	1	6	2	34	2.1	4.1	45.6	2.1	12	4.1 70.4
8-7	29	3.5	0	2	55	9	32	1	99	0	4.1	114	19	66	2.1 205.1
7-6	26	3.5	0	6	38	4	38	9	95	0	11.1	70.6	7.4	71	17 176.4
6-5	31	3.5	0	1	34	2	23	2	62	0	2.2	75.3	4.4	51	4.4 137.3
5-4	17	3.5	0	1	32	2	11	24	70	0	1.2	38.9	2.4	13	29 85.0
4-3	32	3	0	0	18	3	1	10	32	0	0.0	48	8	2.7	27 85.3
3-2	32	3	1	0	11	2	1	2	17	2.7	0.0	29.3	5.3	2.7	5.3 45.3
2-1	30	3	0	0	9	0	0	0	9	0	0.0	22.5	0	0	0 22.5
-1-0	31	3	0	0	8	2	0	0	10	0	0.0	20.7	5.2	0	0 25.8

Observed values for km 36-35 have been doubled since only half of this section was surveyed.

BT = bull trout
GR = Arctic grayling
WG = whitefish (general)
RB = rainbow trout
SU = suckers (general)
NSC = northern squawfish

APPENDIX IV

Table River tagged game fish data

Table River tagged game fish data							
SPECIES	FORK LENGTH (mm)	WEIGHT (g)	CAPTURE METHOD	AGE AT CAPTURE (yrs)	CAPTURE DATE	CAPTURE LOCATION (km)	TAG NUMBER
Arctic grayling	270	227	Angling	4	95/08/02	5.5	G416
Arctic grayling	255	142	Angling	3	95/08/02	5.7	G104
Arctic grayling	260	142	Angling	3	95/08/02	6.2	G412
Arctic grayling	280	170	Angling	4	95/08/02	6.2	G414
Arctic grayling	305	327	Angling	4	95/08/02	6.3	G413
Arctic grayling	350	312	Angling	6	95/08/02	6.4	G415
Arctic grayling	257	199	Angling	3	95/07/21	6.5	G88
Arctic grayling	286	255	Angling	4	95/07/21	6.5	G85
Arctic grayling	235	142	Angling	3	95/08/02	6.6	G103
Arctic grayling	240	142	Angling	4	95/08/02	7.1	G102
Arctic grayling	230	227	Angling	3	95/08/02	7.2	G402
Arctic grayling	310	341	Angling	4	95/08/02	7.2	G401
Arctic grayling	250	142	Angling	3	95/08/02	8.8	G101
Arctic grayling	247	140	Angling	3	95/07/20	9	G81
Arctic grayling	310	312	Angling	4	95/08/02	9.1	G96
Arctic grayling	230	85	Angling	3	95/08/02	9.3	G94
Arctic grayling	240	114	Angling	3	95/08/02	9.3	G92
Arctic grayling	265	199	Angling	3	95/07/20	9.5	G76
Arctic grayling	305	312	Angling	4	95/07/20	9.5	G77
Arctic grayling	305	255	Angling	4	95/08/02	9.7	G93
Arctic grayling	340	312	Angling	5	95/08/01	32	B560
Arctic grayling	370	597	Angling	5	95/08/01	32	B559
Arctic grayling	260	199	Angling	3	95/08/01	32.1	B556
Arctic grayling	290	227	Angling	4	95/08/01	32.1	B555
Arctic grayling	330	312	Angling	5	95/08/01	32.1	B557
Arctic grayling	260	199	Angling	4	95/08/01	32.3	B551
Arctic grayling	275	199	Angling	4	95/08/01	32.3	B577
Arctic grayling	280	255	Angling	4	95/08/01	32.3	B553
Arctic grayling	320	341	Angling	5	95/08/01	32.3	B579
Arctic grayling	355	369	Angling	6	95/08/01	32.3	B576
Arctic grayling	370	539	Angling	6	95/08/01	32.3	B552
Arctic grayling	310	369	Angling	4	95/07/26	32.5	B505
Arctic grayling	310	369	Angling	5	95/07/26	32.5	B506
Arctic grayling	380	511	Angling	6	95/07/26	32.5	B503
Arctic grayling	380	590	Angling	6	95/07/27	32.5	B511
Arctic grayling	340	341	Angling	5	95/08/01	32.5	B580
Arctic grayling	345	426	Angling	5	95/08/01	32.5	B777
Arctic grayling	380	511	Angling	6	95/08/01	32.5	B581
Arctic grayling	315	369	Angling	5	95/07/26	32.8	B508
Arctic grayling	30.5	284	Angling	5	95/08/01	32.8	B593
Arctic grayling	34.5	426	Angling	5	95/08/01	32.8	B592
Arctic grayling	245	199	Angling	3	95/08/01	32.8	B590
Arctic grayling	245	142	Angling	3	95/08/01	32.8	B591
Arctic grayling	265	227	Angling	4	95/08/01	32.8	B587
Arctic grayling	285	284	Angling	4	95/08/01	32.8	B585

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	CAPTURE METHOD	AGE AT CAPTURE (yrs)	CAPTURE DATE	CAPTURE LOCATION (km)	TAG NUMBER
Arctic grayling	290	284	Angling	5	95/08/01	32.8	B584
Arctic grayling	295	199	Angling	4	95/08/01	32.8	B586
Arctic grayling	300	284	Angling	4	95/08/01	32.8	B588
Arctic grayling	310	312	Angling	5	95/08/01	32.8	B589
Arctic grayling	320	312	Angling	5	95/08/01	32.8	B595
Arctic grayling	345	341	Angling	5	95/08/01	32.8	B594
Arctic grayling	320	511	Angling	5	95/07/26	33	B507
Arctic grayling	300	310	Angling	4	95/08/01	33	B597
Arctic grayling	330	426	Angling	5	95/08/01	33	B596
Arctic grayling	310	312	Angling	4	95/08/01	33.4	B778
Arctic grayling	350	465	Angling	5	95/08/01	33.4	B876
Arctic grayling	280	227	Angling	3	95/07/27	34	B512
Arctic grayling	260	284	Angling	3	95/07/27	34.1	B518
Arctic grayling	260	170	Angling	3	95/07/27	34.2	B575
Arctic grayling	320	369	Angling	6	95/07/27	34.2	B519
Arctic grayling	288	199	Angling	4	95/07/27	34.3	B714
Arctic grayling	325	312	Angling	6	95/07/27	34.3	B715
Arctic grayling	330	454	Angling	6	95/07/27	34.3	B516
Arctic grayling	340	480	Angling	6	95/07/27	34.3	B515
Arctic grayling	355	570	Angling	6	95/07/27	34.3	B514
Arctic grayling	360	426	Angling	6	95/07/27	34.3	B717
Arctic grayling	245	114	Angling	3	95/07/28	34.3	B562
Arctic grayling	250	142	Angling	3	95/07/28	34.3	B565
Arctic grayling	280	199	Angling	4	95/07/28	34.3	B563
Arctic grayling	300	312	Angling	5	95/07/28	34.3	B573
Arctic grayling	305	284	Angling	5	95/07/28	34.3	B566
Arctic grayling	305	284	Angling	5	95/07/28	34.3	B572
Arctic grayling	310	312	Angling	5	95/07/28	34.3	B567
Arctic grayling	325	341	Angling	-	95/07/28	34.3	B561
Arctic grayling	330	341	Angling	5	95/07/28	34.3	B564
Arctic grayling	330	369	Angling	5	95/07/28	34.3	B568
Arctic grayling	330	312	Angling	6	95/07/28	34.3	B570
Arctic grayling	335	369	Angling	5	95/07/28	34.3	B574
Arctic grayling	340	426	Angling	5	95/07/28	34.3	B569
Arctic grayling	350	454	Angling	5	95/07/28	34.3	B571
Arctic grayling	348	426	Angling	6	95/07/26	34.5	B707
Arctic grayling	305	255	Angling	4	95/07/27	34.5	B712
Arctic grayling	330	426	Angling	5	95/07/27	34.5	B520
Arctic grayling	335	341	Angling	5	95/07/27	34.5	B517
Arctic grayling	335	341	Angling	6	95/07/27	34.5	B710
Arctic grayling	340	480	Angling	5	95/07/27	34.5	B521
Arctic grayling	350	454	Angling	5	95/07/27	34.5	B711
Arctic grayling	340	369	Angling	5	95/08/01	34.5	B598
Arctic grayling	274	255	Angling	4	95/07/26	35.1	B703
Arctic grayling	298	284	Angling	4	95/07/26	35.1	B705
Arctic grayling	331	569	Angling	6	95/07/26	35.1	B704
Arctic grayling	355	454	Angling	6	95/07/26	35.1	B719

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	CAPTURE METHOD	AGE AT CAPTURE (yrs)	CAPTURE DATE	CAPTURE LOCATION (km)	TAG NUMBER
Arctic grayling	298	341	Angling	6	95/07/26	35.2	B702
Arctic grayling	268	199	Angling	4	95/07/27	35.2	B709
Arctic grayling	300	341	Angling	4	95/07/28	35.2	B723
Arctic grayling	300	284	Angling	4	95/07/27	35.4	B722
Arctic grayling	310	312	Angling	5	95/07/27	35.4	B721
Arctic grayling	324	369	Angling	5	95/07/27	35.4	B708
Arctic grayling	330	454	Angling	6	95/07/27	35.4	B523
Arctic grayling	350	-	Angling	7	95/07/27	35.4	B720
Arctic grayling	355	480	Angling	6	95/07/27	35.4	B524
Arctic grayling	305	341	Angling	4	95/07/21	35.5	B902
Arctic grayling	330	341	Angling	6	95/07/21	35.5	B901
Arctic grayling	245	-	Angling	3	95/08/03	37.6*	R240
Arctic grayling	250	-	Angling	3	95/08/03	37.6*	R233
Arctic grayling	270	-	Angling	4	95/08/03	37.6*	R242
Arctic grayling	290	-	Angling	5	95/08/03	37.6*	R243
Arctic grayling	320	-	Angling	6	95/08/03	37.6*	R244
Arctic grayling	325	-	Angling	5	95/08/03	37.6*	R234
Arctic grayling	325	397	Angling	5	95/08/01	32.2	B554
bull trout	400	650	Angling	5	95/08/02	6.5	G410
bull trout	390	454	Angling	4	95/08/02	9.1	G97
bull trout	360	369	Angling	4	95/07/26	32.5	B502
bull trout	420	766	Angling	8	95/07/26	32.5	B504
bull trout	450	993	Angling	5	95/07/26	32.5	B501
bull trout	380	454	Angling	3	95/08/01	32.7	B779
bull trout	350	482	Angling	5	95/07/21	34	B903
bull trout	510	1305	Angling	-	95/07/27	34.3	B713
bull trout	560	1816	Angling	5	95/07/28	34.3	B725
bull trout	710	3604	Angling	-	95/07/26	34.5	B706
bull trout	610	2497	Angling	7	95/07/28	34.5	B724
bull trout	630	2525	Angling	-	95/07/26	35.5	B701
bull trout	245	-	Angling	4	95/08/03	37.6*	R238
bull trout	335	2840	Angling	5	95/08/03	37.6*	R236
bull trout	435	-	Angling	5	95/08/03	37.6*	R239
bull trout	700	-	Angling	8	95/08/03	37.6*	R237
rainbow trout	244	142	Angling	3	95/07/20	5.5	G89
rainbow trout	256	170	Angling	3	95/07/20	5.5	G90
rainbow trout	220	114	Angling	3	95/08/02	5.5	G99
rainbow trout	296	227	Angling	4	95/07/21	6.1	G86
rainbow trout	344	397	Angling	4	95/07/20	6.5	G87
rainbow trout	260	199	Angling	3	95/08/02	6.5	G408
rainbow trout	290	255	Angling	4	95/08/02	6.5	G405
rainbow trout	290	170	Angling	4	95/08/02	6.5	G409
rainbow trout	300	194	Angling	4	95/08/02	6.5	G411
rainbow trout	330	369	Angling	4	95/08/02	6.5	G406
rainbow trout	330	312	Angling	4	95/08/02	6.5	G407
rainbow trout	257	200	Angling	3	95/07/20	6.8	G84
rainbow trout	230	142	Angling	3	95/08/02	7.2	G404

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	CAPTURE METHOD	AGE AT CAPTURE (yrs)	CAPTURE DATE	CAPTURE LOCATION (km)	TAG NUMBER
rainbow trout	290	312	Angling	4	95/08/02	7.2	G403
rainbow trout	248	142	Angling	3	95/07/20	8.5	G82
rainbow trout	267	200	Angling	3	95/07/20	8.5	G83
rainbow trout	254	170	Angling	4	95/07/20	9	G80
rainbow trout	200	57	Angling	2	95/08/02	9	G98
rainbow trout	210	85	Angling	3	95/08/02	9.2	G95
rainbow trout	276	215	Angling	4	95/07/20	9.5	G79
rainbow trout	255	142	Angling	2	95/07/21	9.5	G78
rainbow trout	280	227	Angling	3	95/08/02	9.7	G91
rainbow trout	320	312	Angling	3	95/08/01	32.1	B558
rainbow trout	275	199	Angling	4	95/08/01	32.3	B578
rainbow trout	300	312	Angling	4	95/07/27	32.5	B509
rainbow trout	335	426	Angling	-	95/07/27	32.5	B510
rainbow trout	220	114	Angling	2	95/08/01	32.5	B582
rainbow trout	265	227	Angling	3	95/08/01	32.5	B583
rainbow trout	295	312	Angling	3	95/07/27	34.3	B513
rainbow trout	230	142	Angling	2	95/07/27	35.1	B718
rainbow trout	240	227	Angling	3	95/07/27	35.3	B522
rainbow trout	230	142	Angling	2	95/07/27	35.4	B525
rainbow trout	235	-	Angling	4	95/08/03	37.6*	R232
rainbow trout	250	-	Angling	4	95/08/03	37.6*	R241
rainbow trout	295	-	Angling	4	95/08/03	37.6*	R235
"*" indicates a fish sampled outside of the two sub sections							

APPENDIX V

Two pass underwater fish count data

Table River underwater fish count, Upper Section, Swim #1

Species	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	Total
Bull Trout	0	0	5	4	2	10	0	21
BT tags	0	0	0	0	0	0	0	0
Rainbow Trout	0	0	6	2	0	0	0	8
RB tags	0	0	0	0	0	0	0	0
Arctic Grayling	0	0	42	59	6	0	0	107
GR tags	0	0	15	34	1	0	0	50
Whitefish	-	-	-	-	-	-	-	918
Squawfish	-	-	-	-	-	-	-	0
Suckers	-	-	-	-	-	-	-	0

Table River underwater fish count, Upper Section, Swim #2

Species	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	Total
Bull Trout	0	0	5	2	5	6	0	18
BT tags	0	0	0	0	0	0	0	0
Rainbow Trout	0	0	11	4	0	0	0	15
RB tags	0	0	0	0	0	0	0	0
Arctic Grayling	0	0	34	76	5	0	0	115
GR tags	0	0	13	43	2	0	0	58
Whitefish	-	-	-	-	-	-	-	676
Squawfish	-	-	-	-	-	-	-	0
Suckers	-	-	-	-	-	-	-	0

Table River underwater fish count, Lower Section, Swim #1

Species	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	Total
Bull Trout	0	1	8	4	1	0	0	14
BT tags	0	0	0	0	0	0	0	0
Rainbow Trout	0	14	38	18	0	0	0	70
RB tags	0	0	2	1	0	0	0	3
Arctic Grayling	6	5	6	13	0	0	0	30
GR tags	0	0	2	1	0	0	0	3
Whitefish	-	-	-	-	-	-	-	600
Squawfish	-	-	-	-	-	-	-	0
Suckers	-	-	-	-	-	-	-	25

Table River underwater fish count, Lower Section, Swim #2

Species	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	Total
Bull Trout	0	1	7	4	2	0	0	14
BT tags	0	0	0	1	0	0	0	1
Rainbow Trout	0	23	56	18	1	0	0	98
RB tags	0	0	3	1	0	0	0	4
Arctic Grayling	0	1	15	17	1	0	0	34
GR tags	0	0	3	1	0	0	0	4
Whitefish	-	-	-	-	-	-	-	437
Squawfish	-	-	-	-	-	-	-	4
Suckers	-	-	-	-	-	-	-	36

APPENDIX VI

Population estimates for the two pass underwater fish count

Table River population estimate snorkel survey, Upper Section (km 35.5 to km 32), August 9, 1995.

Table River Snake Count 1995 — Upper Section

Visibility: 5 m — Length of Reach = 3.5 km — Ave. width = 14.0 m — Area = 4.9 ha — # Swimmers = 2

Date, swim 1: Aug 9, 95

Date, swim 2: Aug 9, 95

Swim #1

Zone	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm RB large	20-30 cm GR	20-30 cm GR large	20-30 cm BT	20-30 cm BT large	20-30 cm MW	30-40 cm RB	30-40 cm RB large	30-40 cm GR	30-40 cm GR large	30-40 cm BT	30-40 cm BT large	30-40 cm MW	40-50 cm RB	40-50 cm RB large	40-50 cm GR	40-50 cm GR large	40-50 cm BT	40-50 cm BT large	40-50 cm MW	50-60 cm BT	50-60 cm BT large	60-70 cm BT	60-70 cm BT large	total RB	total GR	total BT	total RB,GR, & BT	total WW	total SU	total NSC
RS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RMS	0	0	0	343	0	0	0	0	4	0	30	13lb	3	0	0	1	0	30	9lb	3	0	0	0	0	4	0	2	0	0	5	0	12	0	70	343	0	0	0
RM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMS	0	0	0	676	0	0	0	0	2	0	14	4,3lb	2	0	0	1	0	30	24lb	1	0	0	0	0	2	1lb	0	0	0	3	0	66	0	68	676	0	0	0
LS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	819	0	0	0	0	6	0	62	15	5	0	0	2	0	60	24	4	0	0	0	0	6	1	2	0	0	10	0	0	0	0	107	21	138	819	0	0

New whitefish numbers are totals...no size breakdown was undertaken

Swim #2

Zone	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm RB large	20-30 cm GR	20-30 cm GR large	20-30 cm BT	20-30 cm BT large	20-30 cm MW	30-40 cm RB	30-40 cm RB large	30-40 cm GR	30-40 cm GR large	30-40 cm BT	30-40 cm BT large	30-40 cm MW	40-50 cm RB	40-50 cm RB large	40-50 cm GR	40-50 cm GR large	40-50 cm BT	40-50 cm BT large	40-50 cm MW	50-60 cm BT	50-60 cm BT large	60-70 cm BT	60-70 cm BT large	total RB	total GR	total BT	total RB,GR, & BT	total WW	total SU	total NSC
RS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RMS	0	0	0	280	0	0	0	0	9	0	10	3lb	5	0	0	3	0	30	22lb	1	0	0	0	0	5	2lb	1	0	0	2	0	0	0	12	54	5	75	280	0	0
RM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMS	0	0	0	0	0	0	0	0	2	0	34	14,11lb	0	0	0	1	0	37	22lb	1	0	0	0	0	0	0	4	0	0	4	0	0	0	3	61	8	72	280	0	0
LS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	670	0	0	0	0	11	0	24	13	5	0	0	4	0	70	42	2	0	0	0	0	5	2	5	0	0	9	0	0	0	15	115	18	148	670	0	0

New whitefish numbers are totals...no size breakdown was undertaken

SUMMARY

Expansion factor = 1.00 = Average wetted width / total visibility of all swimmers combined. Must be a minimum of 1.0

Expanded Results	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm GR	20-30 cm BT	20-30 cm MW	30-40 cm RB	30-40 cm GR	30-40 cm BT	30-40 cm MW	40-50 cm RB	40-50 cm GR	40-50 cm BT	40-50 cm MW	50-60 cm BT	60-70 cm BT	total RB	total GR	total BT	total RB,GR & BT	total WW	total SU	total NSC	Equal or > 20 cm total RB	total GR	total BT	total RB,GR & BT
Total for swim 1	0	0	0	819	0	0	0	0	6	62	5	0	2	60	4	0	0	6	2	0	10	0	0	107	21	138	819.0	0.0	0.0	0.0	107.0	21.0	138.0
Total for swim 2	0	0	0	670	0	0	0	0	11	34	5	0	4	70	2	0	0	5	5	0	8	0	15	115	18	148	670.0	0.0	0.0	15.0	115.0	18.0	148.0
Mean, swim 1&2	0.0	0.0	0.0	787.0	0.0	0.0	0.0	0.0	8.5	36.0	5.0	0	3.0	67.5	3.0	0.0	0.0	5.5	3.5	0.0	9	0.0	12	111	20	142	787.0	0.0	0.0	11.5	111.0	19.5	143.0
Standard Error	0.0	0.0	0.0	131.0	0.0	0.0	0.0	0.0	2.5	4.0	0.0	0.0	1.0	8.5	1.0	0.0	0.0	0.50	1.5	0.0	2	0.0	3.5	4.0	1.5		131.0	0.0	0.0	3.5	4.0	1.5	
Maximum	0.0	0.0	0.0	227.7	0.0	0.0	0.0	0.0	2.4	10.9	1.4	0.0	0.0	19.2	0.0	0.0	0.0	1.0	1.0	0.0	2	0.0	3.3	31.7	5.8	62.0	227.7	0.0	0.0	3.3	31.7	5.8	40.8
Standard Error	0.00	0.00	0.00	34.67	0.00	0.00	0.00	0.00	0.71	1.14	0.00	0.00	0.70	2.43	0.70	0.00	0.00	0.14	0.43	0.00	1	0.00	1.00	1.14	0.43		34.8	0.0	0.0	1.0	1.1	0.4	
Maximum	0.00	0.0	0.0	102.7	0.0	0.0	0.0	0.0	1.7	7.6	1.0	0.0	0.0	13.8	0.0	0.0	0.00	1.1	0.7	0.0	2	0.00	2.3	22.7	4.0	28.0	102.7	0.0	0.0	2.3	22.7	4.0	28.0
Standard Error	0.00	0.00	0.00	24.68	0.00	0.00	0.00	0.00	0.51	0.82	0.00	0.00	0.20	1.73	0.20	0.00	0.00	0.10	0.31	0.00	0	0.00	0.71	0.82	0.31		24.7	0.0	0.0	0.7	0.8	0.3	

- total count for each swim was obtained by expanding the mid lane count (sum RMS, RM, LM, and LMS x exp. factor), and adding the share lane (RS, LS) counts
- rainbow and squawfish counts are restricted to individuals equal and more than 20 cm in length.
- a table is included below right sided with total rainbow trout, Arctic grayling and bull trout equal and more than 20 cm in order to compare the swim counts with mark-recapture estimates

RS - Right shore — RMS - Right mid-channel — LMS - Left mid-channel — LS - Left shore — RB - rainbow trout — GR - Arctic grayling — BT - bull trout — MW - mountain whitefish — SU - sucker species — NSC - northern squawfish

Table River Upper Site

Mark Recapture Estimates

N = (M + 1)(C + 1)/(R + 1)

N = population estimate

M = number of fish tagged

C = number of fish observed

R = number of tagged fish observed

	Swim #1		Swim #2	
	Arctic grayling	170	Arctic grayling	150
	rainbow trout	80	rainbow trout	178
	bull trout	242	bull trout	209

84 blue tagged GR - 4% (hooking mortality) = 81 (rounded from 80.64)

10 blue tagged RB - 4% (hooking mortality) = 10 (rounded from 9.6)

10 blue tagged BT - 4% (hooking mortality) = 10 (rounded from 9.6)

Table River population estimate snorkel survey, Lower Section (km 9.8 to km 5), August 11, 1995.

Table River Radio Counts 1995 — Lower Section

Visibility = 3.5 m — Length of Reach = 4.8 km — Ave. width = 28.0 m — Area = 13.4 ha — # Swimmers = 3

Date, swim 1: Aug 11, 95

Date, swim 2: Aug 11, 95

Swim #1

Lane	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm RB tags	20-30 cm GR	20-30 cm GR tags	20-30 cm BT	20-30 cm BT tags	20-30 cm MW	30-40 cm RB	30-40 cm RB tags	30-40 cm GR	30-40 cm GR tags	30-40 cm BT	30-40 cm BT tags	30-40 cm MW	40-50 cm RB	40-50 cm RB tags	40-50 cm GR	40-50 cm GR tags	40-50 cm BT	40-50 cm BT tags	40-50 cm MW	50-60 cm BT	50-60 cm BT tags	60-70 cm BT	60-70 cm BT tags	total RB	total GR	total BT	total RB,GR & BT	total MW	total SU	total MSC
RS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RMS	0	0	0	86	1	0	1	0	6	0	3	1g	1	0	0	0	1g	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	3	20	86	0	1
RM	0	0	0	343	0	2	0	0	14	0	1	0	2	0	0	7	0	0	1g	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	23	11	4	38	343	0	0
LM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMS	0	6	0	260	13	3	0	0	14	3g	2	1g	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	11	7	48	260	26	0
LS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	6	0	689	14	5	1	0	36	2	6	2	2	0	0	10	1	12	1	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	70	30	14	114	689	26	1

Note: whitefish (MW) numbers are totals - no size breakdown was undertaken

Swim #2

Lane	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm RB tags	20-30 cm GR	20-30 cm GR tags	20-30 cm BT	20-30 cm BT tags	20-30 cm MW	30-40 cm RB	30-40 cm RB tags	30-40 cm GR	30-40 cm GR tags	30-40 cm BT	30-40 cm BT tags	30-40 cm MW	40-50 cm RB	40-50 cm RB tags	40-50 cm GR	40-50 cm GR tags	40-50 cm BT	40-50 cm BT tags	40-50 cm MW	50-60 cm BT	50-60 cm BT tags	60-70 cm BT	60-70 cm BT tags	total RB	total GR	total BT	total RB,GR & BT	total MW	total SU	total MSC
RS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RMS	0	0	0	195	21	1	0	0	18	2g	8	1g	1	0	0	3	1g	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	9	1	51	195	1	1
RM	0	0	0	139	2	0	1	0	8	1g	8	2g	3	0	0	4	0	11	0	3	1g	0	1	0	1	0	2	0	0	0	0	0	0	0	15	21	8	44	139	25	0
LM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMS	0	0	0	116	6	0	0	0	30	0	6	0	3	0	0	11	5	5	1g	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	5	4	50	116	10	3
LS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	437	23	1	1	0	56	3	15	3	7	0	0	18	1	17	1	4	1	0	1	0	1	0	3	0	0	0	0	0	0	0	98	34	14	146	437	36	4

Note: whitefish (MW) numbers are totals - no size breakdown was undertaken

SUMMARY

Expansion factor = 1.33 = Average wetted width / total visibility of all swimmers combined. (must be a minimum of 1.0)

Expanded Results	0-10 cm RB	0-10 cm GR	0-10 cm BT	0-10 cm MW	10-20 cm RB	10-20 cm GR	10-20 cm BT	10-20 cm MW	20-30 cm RB	20-30 cm GR	20-30 cm BT	20-30 cm MW	30-40 cm RB	30-40 cm GR	30-40 cm BT	30-40 cm MW	40-50 cm RB	40-50 cm GR	40-50 cm BT	40-50 cm MW	50-60 cm BT	60-70 cm BT	total RB	total GR	total BT	total RB,GR & BT	total MW	total SU	total MSC
Total for swim 1	0	8	0	920	19	7	1	0	51	9	11	0	24	17	5	0	0	0	1	0	0	0	93	40	18	152	920.0	33.3	1.3
Total for swim 2	0	0	0	582	31	1	1	0	75	20	8	0	24	23	5	0	1	1	3	0	0	0	121	45	16	186	582.7	46.0	5.3
Mean, swim 1&2	0.0	4.0	0.0	661.3	24.7	4.0	1.3	0.0	62.7	14.0	10.0	0	24.0	20.0	5.3	0.0	0.7	0.7	2.0	0.0	0	0.0	112	43	19	173	691.3	40.7	3.3
Standard Error	0.0	4.0	0.0	168.7	6.0	2.7	0.0	0.0	12.0	6.0	0.7	0.0	0.0	3.7	0.0	0.0	0.7	0.67	0.7	0.0	0	0.0	14.7	2.7	0.0		108.7	7.3	2.0
Maximum	0.0	8.0	0.0	144.0	5.1	0.0	0.3	0.0	13.1	2.0	2.1	0.0	5.0	4.2	1.1	0.0	0.1	0.1	0.4	0.0	0	0.0	23.3	8.9	3.8	36.1	144.0	8.5	0.7
Standard Error	0.00	0.83	0.00	23.64	1.26	0.56	0.00	0.00	2.50	1.25	0.14	0.00	0.00	0.56	0.00	0.00	0.14	0.14	0.14	0.00	0	0.00	3.09	0.56	0.00		22.6	1.5	0.4
Maximin	0.00	0.3	0.0	51.4	1.8	0.3	0.1	0.0	4.7	1.0	0.7	0.0	1.8	1.5	0.4	0.0	0.05	0.0	0.1	0.0	0	0.00	8.3	3.2	1.4	12.9	51.4	3.0	0.3
Standard Error	0.00	0.30	0.00	6.09	0.46	0.20	0.00	0.00	0.89	0.45	0.05	0.00	0.00	0.20	0.00	0.00	0.05	0.05	0.05	0.00	0	0.00	1.39	0.20	0.00		9.1	0.5	0.1

Equal or > 20 cm

total RB	total GR	total BT	total RB,GR & BT total
74.7	26.3	17.3	117.3
109.0	44.0	17.3	161.3
87.3	34.7	17.3	139.3
13.7	6.3	0.0	
19.2	7.2	3.8	29.0
2.8	1.9	0.0	
6.9	2.8	1.3	10.4
0.9	0.7	0.0	

- total count for each swim was obtained by expanding the real lane count (sum RMS, RM, LM, and LMS x exp. factor), and adding the share lane (RS, LS) counts
- sucker and squawfish counts are restricted to individuals equal and more than 20 cm in length.
- a table is included (lower right side) with total rainbow trout, Arctic grayling and bull trout equal and more than 20 cm in order to compare the swim counts with mark recapture estimates

RS - Right shore — RMS - Right near shore — RM - Right midchannel — LM - Left midchannel — LMS - Left near shore — LS - Left shore — RB - rainbow trout — GR - Arctic grayling — BT - bull trout — MW - mountain whitefish — SU - sucker species — MSC - squawfish

Table River Lower Site

Mark Recapture Estimates

N = (M + 1)(C + 1)/(R + 1)

N = population estimate

M = number of fish tagged

C = number of fish observed

R = number of tagged fish observed

	Swim #1		Swim #2	
	Arctic grayling	132	Arctic grayling	180
	rainbow trout	418	rainbow trout	444
	bull trout	42	bull trout	21

20 green tagged GR - 4% (hooking mortality) = 18 (rounded from 18.2)

32 green tagged RB - 4% (hooking mortality) = 21 (rounded from 21.12)

2 green tagged BT - 4% (hooking mortality) = 2 (rounded from 1.92)

APPENDIX VII

Mean fork length, weight, and age data for three fish species sampled in the Table River watershed

Mean length, weight, and age data for three fish species sampled in the Table River watershed

Species	Location	[1]Mean Length (mm)	[1]Mean Weight (g)	[1]Mean Age (yrs)
Arctic Grayling	lower section	241(34)	158(34)	3.09 (34)
	upper section	316(84)	345(84)	4.83 (84)
	overall	294 (124)	290 (117)	4.33 (123)
Bull Trout	lower section	395(2)	552(2)	4.50(2)
	upper section	498(10)	1481 (10)	5.29(7)
	overall	468(16)	1443 (13)	5.23 (13)
Rainbow Trout	lower section	237(36)	151(36)	3(36)
	upper section	271(10)	241 (10)	2.89(9)
	overall	246(49)	171 (46)	3.04 (48)

[1] Sample size (n) immediately follows mean length, mean weight, and mean age values.